ASSESSMENT OF KNOWLEDGE AND ATTITUDE OF CHILDREN REGARDING THE SPORTS RELATED TRAUMATIC INJURIES AND ITS PREVENTION USING MOUTHGUARDS

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DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled **"ASSESSMENT OF KNOWLEDGE AND ATTITUDE OF CHILDREN REGARDING REGARDING SPORTS RELATED TRAUMATIC INJURIES AND ITS PREVENTION USING MOUTHGUARDS "** is a bonafide and genuine research work carried out by me under the guidance of **Dr.V. Nilaya Reddy, M.D.S.,DNB.,** Professor, Department of Paedodontics and Preventive Dentistry, Ragas Dental College and Hospital, Chennai.

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This dissertation is submitted to **THE TAMILNADU Dr. MGR MEDICAL UNIVERSITY** in partial fulfilment for the degree of **Master of Dental Surgery in the Branch VIII – Peadodontics & Preventive Dentistry**. It has not been submitted (partially or fully) for the award of any other degree or diploma.

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ABSTRACT

Aim and Objective: To assess the attitude and awareness of athletically active children (6-12 years old) regarding sports related oro-facial injuries, their emergency care, and the effectiveness of mouthguards in prevention of sports related oro-facial injuries.

Materials and Methodology: 160 athletically active children belonging to the age group of 6-12 years practicing Boxing, Football and Martial arts (Karate, taekwondo, judo) were selected from various sports academies in and around Chennai. A relevant questionnaire aimed at identifying the perception, awareness and attitude of children regarding oro-facial injuries and the role of mouthguards in prevention of sports related oro-facial injuries was distributed. From the responses received the data was analyzed.

Results: The present study findings showed a predominant male participation (80.6%) in sports activities compared to the female children (19.4%) with all sports played under the supervision of the coaches(100%) and majority of the children(59.4%) having a knowledge regarding the risk associated with the sport played. Majority of the children 114(71.25%) were aware of mouthguards, coaches (72%) and media (28%) was the main source of information. At the start of the study only 49 children (30.62%) were using mouthguards, following counseling and intervention 142 children (88.75%) were using mouthguards regularly and felt it helped in minimizing the risk of

sustaining oro-facial trauma and were willing to use it continuously and recommended it to others as well in contrast to 18 children (11.25%) who used them occasionally. 5(3.12%) children among the 18 who were occasional users sustained oro-facial injury.

Conclusion: The results showed that the need for mouthguard implementation is of critical importance. Dentists play a major role in promoting mouthguards for persons involved in contact sports and to educate the children, parents, teachers, and coaches regarding sports related oro-facial injuries prevention and management.

Keywords: ***SPORTS PARTICIPATION, DENTAL TRAUMA, EMERGENCY CARE, MOUTHGAUARD, PREVENTION.***

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Introduction

INTRODUCTION

A physically dynamic way of life is fundamental for a sound living, which can be accomplished by active participation in sports-related exercises. This could help in providing refreshment, relaxation, socialization, diversion, and change in general well-being.

Oro-facial injuries are a group of wounds relating to the oral and facial parts of the human body which incorporate tooth fractures, dental avulsions, dental luxations due to blow under the jaw, jaw fractures and laceration of the gums, tongue, lips and cheeks.[1] Considering that 13 – 39% of dental injuries are owing to sports and that craniofacial injuries comprise one-sixth of the aggregate injuries occurring in sports[2,3], it is clearly evident that there is a cozy connection amongst sports and oro-facial injuries. Sports-related activities are associated with traumatic injuries which are sometimes so deadly that it may lead to permanent disability and have an impact on the person's psychological attitude to further sporting participation. It can also have an effect on physical, mental, practical, social and economic aspects of life. Oro-facial wounds can bring about the abnormal shedding of primary teeth, delayed eruption of permanent teeth, discoloration of teeth, development of painful abscesses, and tooth loss bringing about unaesthetic gaps in the mouth of the wounded victim.[3] Cortes, Marcenes, and Sheiham

(2002) showed that youngsters with awful dental wounds endured mental and social challenges, for example, emotional issues and isolation.[4]

The prevalence of oro-facial wounds differs based upon the type of game played, the level of contact, and the age, sex and topographical area of the subject examined. For example, football, rugby, jiu-jitsu, handball was reported to have the highest prevalence of oro-facial injuries.[5] Males seem to be at more serious risk than females in contact sports.[6]

Treating and counteracting sport-related oro-facial injuries is of specific significance in light of their prevalence and seriousness. Dental practitioners can play an important role in the identification and provide definitive preventive protocols for those who are considered to be at risk. Mouthguards, face masks, and helmets are the three shielding types of equipment that provide assurance for protection against sports-related oro-facial injuries.[3,7] Mouthguards will be the concentration of this study since they are intraoral and would thus be incorporated into the dental practitioner's procedures. This intraoral device is intended to fit one or both dental arches with a specific end goal to protect against oro-facial injuries during sports activities. It is trusted that mouthguards help diminish oro-facial injuries by acting as impact-absorption devices which dissipate the energy of a traumatic blow, accordingly averting direct force on oral structures. They are additionally

accepted to act as a cushion between the mandible and maxilla in this way decreasing the seriousness of injuries identified with condylar displacement.[8]

The Dentistry Academy of General in 2005 conducted an analysis and evaluated that fabricating a specially designed custom-made mouth protector is less than 20 times the cost of treating one avulsed tooth, thus indicating that simple prevention alone can often decrease the enormous financial impact of such oro-facial injuries. Its utilization has been made obligatory during the training sessions and in game circumstances in few countries to diminish the incidence and recurrence of games related oro-facial injuries [AAPD].[9]

Studies have shown only limited percentage of athletically active children using these protective devices due to various reasons like discomfort and difficulty in communicating during the sports activity.[9]

Dentists should educate the children, parents, teachers, and coaches regarding the benefits of protective devices, preventive strategies and emergency management of dentofacial injuries which necessitates to have information regarding the awareness and usage of mouthguards by the sporting children. Hence, the present study was done to assess the awareness and attitude of athletically active children regarding sports-related oro-facial injuries and the role of mouthguards and its efficiency in the prevention of oro-facial injuries.

Aims and Objection

AIMS AND OBJECTIVES

- To assess the attitude and awareness of athletically active children regarding sports related traumatic injuries, protective devices and preventive measures.
- To assess the effectiveness and acceptability of mouthguards in prevention of sports related dental injuries.

Review of Literature

REVIEW OF LITERATURE

Sane J, Ylipaavalniemi P (1988) studied the dental injuries occurring from 1979-1985 in Finland in 6 contact team sports (American football, bandy, basketball, team handball, ice hockey and soccer) A total of 23,395 accidents occurred among registered players; 1526 (6.5%) of these accidents affected the dental structures. Contact between players caused over half of the accidents. Results showed that crown fractures were the most common type of dental injury, occurring most often to the maxillary central incisors. In most accidents (58.6%) only one tooth was affected. The highest rate of incidence was found in ice hockey (8.9%) and the lowest in American football (1.4%). The low incidence in American football was due to adequate facial and dental protection that is mandatory in this sport. They concluded that that even a minor effort to ensure mandatory dental protection for all players involved in contact sports would have major effects in preventing unnecessary dental injuries and associated life-long discomfort, as well as reducing the high treatment costs involved.[3]

Chapman PJ (1989) discussed the role of dental profession in relation to prevention of dental and other oro-facial sporting injuries which is more important and to increase professional awareness and interest regarding contact sports and use of mouthguards. The author also emphasized on the provision of

professionally fitted (custom) mouthguards for persons involved in contact sports, recognition of the 'injury prone dentition', and expertise in immediate management of dental injuries form the basis of sports dentistry and also suggested that a custom made mouthguard with a proper fit is mandatory during contact sports.[10]

McNutt et al (1989) conducted a study to determine attitudes of high school football coaches regarding the usefulness of mouth guards and their criteria for selecting a specific mouth protector. 2470 junior and senior high school football players were selected from the Children's Hospital of Alabama. All the subjects were asked a series of questions concerning his use of mouth protectors and history of oral trauma while participating in sports and also were questioned regarding any history of loss of consciousness,type and location of the injury, the sport during which the injury occurred and whether the athlete was wearing a mouth protector at the time of injury. A complete physical and oral examination was performed with a tongue blade and artificial light. The results showed that 9% of all players had some form of oral injury, 3 % reported with a loss of consciousness, 75% of the injuries occurred when they were not wearing mouth guards (40% occurred during baseball and basketball) and 56% of all players suffered from concussions. This study concluded that use of mouth guards should be made mandatory in baseball and basketball so that adequate oral protection can be achieved.[11]

Hayrinen-Immonen et al (1990) conducted a six year follow up study of sports related dental injuries in children and adolescents to evaluate the late complications of sports related dental injuries.The records of 106 patients with a mean age of 11.8 years ranging (7-24 yrs), with sports related dental traumas treated in 1983 at the public oral surgery unit in Helsinki, Finland were analysed. Among them 51 were relocated and examined after six years of dental injury. The records were compiled and it showed that 39 % of cases, the injuries had arisen from ice hockey or skating, 30% were uncomplicated crown fractures, concussions or subluxations. During the six- year follow- up , of 80 teeth in 51 patients, root resorption was found in 6 teeth (7.5%), periapical lesions were noted in two teeth (2.5%) and obliteration of the pulp was seen in 4 teeth (5%). Three teeth (3.7%) seems to be non-vital. The pulp had been extirpated in 13 of the traumatized teeth (16%). Almost 13.7% of cases were found to have complications after six years. The results showed that long follow-up periods are needed after dental injury.[2]

Raphael et al (1990) conducted a study to evaluate the parental awareness of the emergency management of avulsed teeth in children. Over 2000 parents were surveyed during a four- week period at 20 suburban vacation swimming centres. The results were compiled and analysed, it indicated that almost two-thirds of respondents would attempt replantation of an avulsed tooth but further questioning showed they did not know the correct procedures. 33%

of respondents were unaware of any after-hours emergency dental services. 92% felt they should seek professional help urgently following an avulsion injury, but their knowledge of transport media for the tooth was poor. Only 5% knew that milk was the medium of choice for both washing and transporting an avulsed tooth. 90% of parents surveyed had never received advice on what to do in the event of an accident where a permanent tooth was avulsed. This study concluded that the need for educational campaigns towards parents was mandatory to increase their knowledge and management procedures required in case of avulsed teeth.[12]

Flanders et al (1995) conducted a pilot study of all injuries occurring in football and basketball in selected Illinosis high schools. Forty- two high schools participated in the football survey and six high schools in the basketball study and the athletic trainer agreed to assist with the survey activities. A survey questionnaire included demographic data, type of injury, soft-tissue injury, fractures of facial bones, injury to the temporomandibular joint, injuries to the dentition and also regarding the type and use of mouth protection. This study concluded that football players do not encounter oro-facial injuries as often as other athletes. The author suggested the mandatory use of face-guards and mouth protectors in football and recommended mouthguard usage in all contact sports.[13]

Nowjack-Raymer RE et al (1996) discussed on the use of mouthguards and headgear in organized sports by school aged children. This study assessed the wearing practices using the data from the Child Health Supplement of the 1991 National Health Interview Survey that focused on the responses given by the 9,630 interviewed parents of children aged 7-17.Results showed that football was the only sport in which the majority of children used mouthguards and headgear. While statistically significant differences ($p < .05$) were found in use of the equipment in all sports by grade level, gender, parent's.education, ethnicity, and by region of the country, these differences were not consistent across sports. They concluded that under the programme banner titled the Healthy People 2000, the public health sector along with private sector calls for extending requirements for use of oro-facial protective devices to all organizations sponsoring sports that pose risk to injury. Clearly, they stated that if oro-facial injuries are to be prevented in sports, demonstration research projects and innovative programs using multifaceted approaches at all levels, across many sports, and in many environments must be tested and implemented.[7]

Diab et al (1997) conducted a study to evaluate the parental attitude towards mouthguards in which a set of questionnaire was mailed to 1800 parents (children 9-14 years old) who were chosen randomly from Henrico County, VA public school system. The questionnaire consisted of questions

regarding the importance of mouthguard usage in prevention of sports related injuries. Of the total injuries reported, 19% were sustained in basketball, 17% in baseball, and 11% in soccer. The results showed the sports which required the mandatory use of mouthguards in decreasing order, football, boxing, ice hockey, wrestling, field hockey, and karate. He concluded that parents view themselves as equally responsible as coaches for maintaining mouthguard usage and also recommended the mandatory use of mouthguard in basketball, baseball, and soccer.[14]

Hamilton et al (1997) conducted a study to investigate the lay knowledge of the management of avulsed permanent incisors. Postal questionnaires were sent to all physical education teachers, school nurses and secretaries, attendants in swimming baths and leisure centres and to 220 parents of teenage children in a defined area of North West England. The overall questionnaire response rate was 86.9%. 53.6% of respondents claimed to have received first aid training, only 3.1% could remember about the management of dental injuries. There was evidence that dental health education in this field canbe effective, more than 80% of the respondents stated that they were not willing to replant an avulsed incisor themselves, the main reason being lack of knowledge and training. This study concluded that there is a need for potentially effective dental health education program and other sources such as posters,

magazines and newspaper to increase the knowledge regarding the management of avulsed tooth.[15]

Berg R, Berky et al (1998) assessed high-school athletic coaches perceptions about oral-facial injuries and mouthguard use in sports. The study was conducted by the Office of Oral Health of the Arizona Department of Health Services and by the Department of Applied Dentistry at the University of Colorado School of Dentistry, a 11 set of questionnaire aimed at identifying the perceptions of coaches regarding oral-facial injuries was mailed to 1,043 coaches of nine sports such as wrestling, basketball, baseball, softball,soccer and volleyball listed in the Arizona Interscholastic Athletic Association's directory. A total of 508 (43.7 percent) of the 1,160 questionnaires were completed and returned. About 363 (72%) of the coaches said that their athletes sustained oral-facial injuries, while 28% of athletes used mouthguards regularly, 48% of the athletes had sustained injuries and did not use mouth-guards regularly, and 31% of coaches said they would not encourage mouthguard usage. This study suggested that the concerned dental professionals should focus advocacy for mouthguard use in the sports directly on coaches, coaches' associations and rule-making organizations.[6]

Kvittem et al (1998) conducted the study to determine the incidence of oro-facial injuries in athletes attending seven neighboring Minnesota high schools who participated in varsity soccer, wrestling, and basketball during the

1996-97 academic year. Incidence of oro-facial injuries was determined through athletes written surveys and athletic trainer records. Results showed that the survey response rates ranged from 86.3% to 94.0 % among schools for all sports. The incidence rate of at least one oro-facial injury per athlete in a season was 27.6 percent in soccer, 72.3 percent in wrestling, and 55.4 percent in basketball. Fixed orthodontic appliances posed a higher risk for sustaining an injury in all sports. Half of the athletes believed mouthguards prevent injuries; however, only 6 percent of the athletes reported mouthguard use. It was concluded that the substantial rate of oro-facial injuries among high school athletes participating in soccer, wrestling, and basketball needs to be minimized. The dentists and the school officials should inform the athletes about the risk for oro-facial injuries, and to consider mandated mouthguard use for these athletes.[1]

Banky et al (1999) conducted a survey among 961 Australian footballers of varying age and football ability in order to determine the prevalence of mouthguard use during training and match play. The footballers were divided into two groups, junior football players and elite players. The junior competitive players were under 18 years old and the Elite players were national level players who participated in Australian football league competition. The prevalence of mouthguard use during matches was 64% for juniors and 89% for elite footballers whereas the mouthguard use at the training

was 1% for junior and 40% for elite players. Among the 72% of the players who wore a mouthguard during matches, 73% wore custom- made mouthguards and 27% used 'boil & bite' mouthguards. They found that boil and bite mouthguards unsatisfactory for dental protection. Of the players who did not currently use mouthguards, most had tried them previously but found them uncomfortable to wear. This study strongly recommends the use of custom made mouthguards and also implies on the provision of emergency dental treatment for sport participants of the non- elite level and for improved dental injury prevention measures to avoid expensive and potentially disfiguring dental injuries in young athletes.[16]

Maestrello CL et al (1999) conducted a study to analyse the attitudes of virginia general dentists, orthodontists and pediatric dentists towards mouthguard protection. A thirteen question survey regarding the fabrication, marketing and recommendation of mouthguards was sent to 2,500 dentists at the Virginia school of Dentistry, Common wealth university. Results showed that 97% of orthodontists, 84% of Pediatric dentists, 67 % of general dentist recommended mouthguard protection for their athletically active patients. General dentists (59%) and Pediatric dentists (56%) recommended the custom mouthguard while orthodontists recommended the prefabricated stock type (77%) as their primary choice of mouthguard. 26% of the general dentists did not recommend mouthguard protection as the patient could get it from a less

expensive source and they felt that dentists has not received formal training on fabrication of mouthguards. The study concluded that most of the dentist agreed that athletically active patients require mouthguard protection, however a few dentists question whether they were the ones responsible for distributing and fabricating mouthguards.[17]

Marcenes et al (2000) conducted a study to assess the causes and the prevalence of traumatic injuries to the permanent incisors of 12-year-old schoolchildren in Jaragua do Sul, Brazil. 476 children of both sexes were selected by multistage sampling technique. Clinical examination of upper and lower permanent incisors was done to record the type of trauma sustained, occurrence of dental injuries, incisal over- jet, lip coverage, traumatised anterior teeth, cause of trauma, age, sex, parents' levels of education and employment status and family income was carried out using Chi- square test. Results showed boys experienced double the percentage of injuries compared to girls. Children with incisal overjet greater than 5mm (P=0.077) and inadequate lip coverage (P=0.667) were not more likely to have experienced dental injuries. The main causes of injuries to the permanent incisors were falls (26 per cent), traffic accidents (20.5 %), sports (19.2 %), violence (16.4 %) and collisions with people or inanimate objects (6.8 %). Socio-economic measures had no significant effect on prevalence of trauma. This study concluded that policy

makers must take the causes of trauma into account when developing a strategy for the prevention of dental injuries.[18]

Newsome et al (2001) discussed the risk of dental injury during sports participation, the role of the mouthguard in preventing injury, types of athletic mouthguard, implications for patients undergoing orthodontic treatment and behavioural aspects of mouthguard wear. They found that participation in a number of sports does carry a considerable risk of sustaining dental injury, not only in the so-called contact sports such as rugby and hockey, but also in less obviously dangerous sports such as basketball. They have also found mouthguard to be the most effective way of preventing such injuries and it is also clear that the custom-fabricated mouthguard, in particular the pressure-laminated variety, is seen to afford most protection.[19]

Ferrari CH, Medeiros JMF (2002) studied the occurrence of dental trauma in different sports, as well as to check if athletes used mouthguard during sport activities, and knew the significance of its utilization. A total of 1189 male athletes were approached for interview through questionnaire which was answered by athletes of six different sport modalities: two involved martial arts (judo and jiu-jitsu) and four involved ball games (football, basket ball, handball, skate hockey) in official competitions which took place between March 1998 and November 1999. A total of 204 out of total practiced jiu-jitsu, 203 practiced judo, 144 were hockey players 310 foot ball players, 115 basket

players and 172 hand ball players. The results indicated that taking into accounts; the responses of each individual sport, trauma experienced by the number of athletes was as follows: 32.1% martial arts (41.2% jiu-jitsu, 22.3% judo), 11.5% hockey, 36.4% basket ball, 37.1% handball and 23.1% soccer. Mouthguards were used by the following athletes: 13% martial arts (19.6% jiu-jitsu,7.4 judo), 91.3% hockey, 2.1% basket ball, 4% hand ball, 1.4% soccer. They concluded that athletes with the highest rate of dental traumas were jiu-jitsu, handball and basketball players, respectively, which were the sports presenting the lowest rate of mouthguard usage. Hence the coaches, dentists, and parents should help athletes to understand the necessity of using mouthguard while engaged in sport activities.[5]

Ilma de Souza Cortes M et al (2002) conducted a study to assess the socio-dental impact of untreated fractured anterior permanent teeth on the oral health-related quality of life in Brazilian school children. A population-based matched case-control study was used and a 2: 1 control-to-case ratio was adopted. The cases were 68 children 12–14 years old, having non-restored teeth, with fracture involving dentin. The controls were 136 children without any traumatic dental injury. They were matched by age, sex and socio-economic status. The Oral Impact on Daily Performances (OIDP) index was used to measure the impacts. The response rate was 100%. Results of conditional logistic regression showed that children with fractured teeth were

20 times (95% CI = 2.2–45.6) more likely to report any impact on their daily living than children with no traumatic dental injury. These results remained statistically significant for the items of the OIDP separately, 'smiling' ($P < 0.001$), 'maintaining emotional state' ($P < 0.001$), 'eating' ($P < 0.01$), 'enjoying contact with people' ($P < 0.01$) and the overall OIDP ($P < 0.001$), after adjusting for confounding variables such as the Aesthetic Component of the Index of Orthodontic Treatment Need and DMFT index in a multiple conditional logistic regression. From the results obtained they concluded that the children with untreated dental fracture of permanent teeth had more impacts on their daily living than children without any traumatic injury.[4]

Lang B et al (2002) conducted a comparative study between Switzerland and Germany about the frequency of the dental injuries in handball, mouthguard utility habits among athletes, awareness regarding first emergency measures post-dental trauma and their resulting consequences for athletes and coaches alike. The study population included 112 persons of whom, 28 were females and 84 were males. Among 112 study participants, 32 have witnessed a dental trauma, 12 experienced dental trauma themselves and only 10 of them wore a mouthguard. The results showed that the ara of handball still requires more information and education. The reason suggested for not wearing a mouth guard was that, the mainstream players did not consider it as a paramount necessity and such preventive measures were undertaken only after a dental

injury is reported. This study concluded that, use of mouth guards is mandatory in sports that anticipate a greater risk for oro-facial injuries. Also, awareness among young athletes regarding tooth protection and usage of custom- made mouth guards can avert possible damages that are otherwise likely to occur.[20]

Cornwell et al (2003) conducted a study to measure the use of mouthguard by basketball players in Australia and to assess the players' knowledge about the value of mouthguards for prevention; and to describe their experience of oro-facial injury. Two questionnaires (baseline and follow-up) were administered to a convenience sample of 496 basketball players in Victoria, Australia. Players recruited were youths (12-15 year old,) and adults (18 years and over), from all basketball levels (social to elite). Completion of the baseline questionnaire was followed immediately by an intervention comprising written and verbal information, a mouthguard blank and instructions on mouthguard construction. The follow-up questionnaire was mailed to all respondents 10-12 weeks later;135 youths (65%) and 157 adults (54%) completed this. Mouthguard wear at baseline was low but was more frequent at games (62%) than at training (25%). Despite 90% of players acknowledging the protective value of a mouthguard, wear by youths did not increase following the intervention, and wear by adults increased by only14% for training and 10% at games. Previous oro-facial injury was recorded at baseline by 23% of players, but few had requested compensation from

Basketball Australia (youths,17%; adults, 30%). Mouthguard wear was significantly more frequent amongst players with previous injury; such players were 2.76 times more likely to be wearers than those without previous injury.Youths were 2.31times more likely to wear mouthguards than adults. Only 34 players (12% of respondents at follow-up) had a mouthguard constructed from the blank provided. Although youth and adult groups differed, the overall extent of mouthguard use was disappointingly low. They concluded that despite wide recognition of mouthguard value, the intervention had little effect on promoting their use.[21]

Levin et al (2003) in a study evaluated the occurrence of oral and dental injuries in young Israeli population engaged in diverse sport activities and the use of protective devices, such as mouthguards, during sport activities was also evaluated. A population of 943 young adults, 95% males and 5% females (age18-19), was surveyed using a questionnaire relating to the type of sport activity practiced, past dental injuries over their lifetime, specifying the time and type of sports in which the injury occurred and the use and awareness of the protective devices. Of the total population examined, 850 (90%) were active in atleast one type of sport, either as professionals or as amateurs.The most commonly practiced sports were soccer (54% of all active participants) and basketball (50%).The total number of dental and oral injuries experienced during all sport activities was 229, affecting 27% of the participants of whom 73

(9%) suffered dental injuries. Most dental injuries occurred during the basketball and soccer training sessions and matches reaching 42 and 41% of the total number of injuries, and affected 7.2 and 6.6% of the basketball and soccer players. Traumatic dental injuries in other sports occurred in less than 7% of the participants in these activities. Only 27% of the participants were aware of the protective devices, such as a mouthguards, and only 3% actually used these devices. These results point to the high risk of potential dental and oral injury during sport activities, the little knowledge about the benefits of using mouthguards and their limited utilization. The importance of public health education to increase the awareness of protective measures and devices and their actual use in Israel is the main focus. The study concluded that it should be a combined duty of dentists and sports physicians and of the coaches to encourage the use of protective devices during training and games.[22]

Onyeaso CO et al (2003) conducted a study to assess the perceptions of secondary school sports coaches about oro-facial injuries and mouth protectors usage in sports by the adolescent athletes. A set of questionnaire was distributed to 42 coaches from 23 secondary schools randomly selected from different parts of Ibadan city in Nigeria. The questionnaire sought information regarding mouth protector usage, when it is required, its types, reasons for choosing a specific mouth protector and personal feeling about prevention of oral injury. All the coaches, 25(59.5%) males and 17(40.5%) females with age range of

19-51 years completed and returned the forms. 95.2% of the coaches believed that mouthguards prevent oral injuries and 95.2% of them also would like more information on different types of mouthguard, while 4.8% each felt otherwise. The main factor determining the choice of the type of mouthguard for athletes by the coaches was the quality of oral protection (57.1%), and the next was the cost (23.8%). Acceptance of mouthguard was scored as positive by 88.1% of the athletes. 81.0% of the coaches felt that mouthguard should be worn at all times (during practices and competitions) while19.0% would prefer the use during competitions only. The majority of the coaches (71.4%) believed that boxing needs mouthguards, 2.4% each indicated football (soccer) and Judo while 11.9% of the coaches did not indicate any sport. The study concluded that the dentists should be more involved in providing information to coaches about mouthguards, schools and the government should be encouraged to consider making the use of mouth-guards compulsory for the adolescents and young adults involved in contact sports, policies should be developed to require school officials to report oro-facial injuries and to inform athletes of their risk for oro-facial injuries and the dentists should question their patients, especially children, adolescents, and young adults, regarding their participation in sports and also about the risk of oro-facial injuries so that adequate oral protection can be recommended.[23]

Onyeaso CO, Adegbesan OA (2003) conducted a study to determine the extent of awareness concerning mouthguard use for sports as well as the amount and type of oro-facial trauma associated with sporting activities among Nigerian athletes in which a questionnaire was distributed among 273 athletes (91 %) who participated in the National Sports festival in May 2002 in Benin City, Nigeria. The questionnaire included the history of trauma, type, location of injury and the use of mouthguards. The sample was representative of all the 36 states in Nigeria including the Federal capital territory, Abuja and results showed that awareness concerning mouthguards was claimed by 226 (82.8%) of the athletes but significantly fewer athletes who claimed awareness of the devices were using them. Only 93 (41.2%) of this mouthguard-aware group knew of the three types of mouthguard available. Of all the respondents, 131 (48.0%) believed that wearing mouthguards would reduce the prevalence and/or severity of oro-facial injuries during sports. In all, 158 (57.9%) of them had one form of oro-facial injury or the other with contact sports accounting for most of them (78.5%) while 21.5% resulted from non-contact events. The study concluded that the prevalence of oro-facial injuries was significantly lower while wearing mouth protectors. Although the majority of the athletes claimed awareness of mouthguards, less than one-third used them. Hence, there is a need for the dentists to educate the athletes more concerning mouthguards.[24]

Chukwudi Ochi Onyeaso (2004) did a study to determine the awareness of mouthguard utility and the oro-facial trauma associated with and without a mouth guard wear among 1127 secondary school students (683 males; 444 females) across 23 schools in Nigeria. A 13 set of self – explanatory questionnaire was provided to the study population to obtain data for analysis. The results showed that only 19.6% wore mouth guards despite 65.3% of the athletes acknowledging the importance of wearing it. 34.5% of the athletes reported having sustained one form of oro-facial injury or the other previously. The prevalence of oro-facial injuries was significantly lower when a mouthguard was used ($p<0.05$), and most of the injuries occurred during contact sports. The results suggested that wearing of mouth guards during contact sports is essential. Contact sports accounted for most of oro-facial injuries and statistically more males sustained oro-facial injuries than females. The study concluded that there is a need for the enforcement of mandatory mouthguard use in contact sports.[25]

Onyeaso CO, Arowojolu MO et al (2004) conducted a study to assess the knowledge and attitudes of Nigerian dentists towards mouthguard protection. A pre-tested 15-item, one-page questionnaire was distributed to 185 dentists practising in different parts of the country with government hospitals or private establishments, by 'hand-delivery' system. 170 forms were filled and returned (92%). The period of the survey was between April and August 2003.

The data was compiled and the results showed about 49% of the respondents indicated having only classroom lectures on mouthguards during their undergraduate training, 11% said they had some laboratory sessions in addition while no form of education on mouthguards was received by 40%. About 82% had never recommended mouthguard protection for athletic patients, and the major reason was no formal training in the subject. Only 58.5% were familiar with the different types of mouthguards, 75.9% would not be able to supervise or fabricate mouthguards and 50.6% would prefer custom-made mouthguard for their athletic patients. Over 98% agreed that mouthguard usage in contact sports should be encouraged with the involvement of the dentists. This study concluded that Nigerian dentists support mouthguard protection in contact sports and want to be involved in the provision of mouthguards for athletes but their knowledge of the protective device is inadequate and also suggests that it is mandatory for the dentists to have the knowledge about the mouthguards and its use.[26]

CDHA Position Paper on Sports Mouthguards (2005) Research done by the Canadian Dental Hygienists Association shows that oro-facial injury in sport is prevalent and carries significant medical, financial, cognitive, psychological and social costs. It also confirms that mouthguards can prevent oro-facial injuries. The CDHA therefore strongly recommends that dental hygienists play an integral role in the prevention of orofacial injury in sports and

promote properly fitted mouthguards as an essential piece of protective equipment, in sports that present a risk of oro-facial injury at the recreational and competitive level, in both practices and games.[27]

Finch C, Braham R et al (2005) did a randomized controlled trial to evaluate the effectiveness of mouthguards for preventing Head/ Oro-facial (H/O) injuries in the Australian football players. Twenty three teams (301 players) were recruited from the largest community football league in Australia. Teams of players were randomly allocated to one of two mouthguard wearing behaviour: MG (custom-made mouthguard) or C: control (usual mouthguard behaviours) . All injuries during training and games, and mouthguard use were monitored over the 2001 playing season. Injury rates were calculated as the number of injuries per 1000 person hours of playing time. Adjusted incidence rate ratios were obtained from Poisson regression models. Players in both study arms wore mouthguards, though it is unlikely that many controls wore custom made ones. Wearing rates were higher during games than training. The overall rate of Head/oro-facial injury was 2.7 injuries per 1000 exposure hours. The rate of Head/Oro-facial injury was higher during games than training. The adjusted H/O injury incidence rate ratio was 0.56 for MG versus C during games and training, combined. They concluded that custom-made mouthguards seems be more effective in preventing oro-facial injuries.[28]

Kececi et al (2005) did a study to investigate the incidence and type of dental injuries associated with three different sports among Turkish elite athletes, who do not contact (volleyball), contact directly (taekwondo) or indirectly (handball) with competition rivals additionally, awareness and use of mouth-guards were also compared. During the 2003 and 2004 Turkish National Championships in three sports, 50 taekwondo, 62 handball and 50 volleyball male athletes were interviewed by questionnaire. Results showed that taekwondo and handball athletes experienced significantly more dental trauma than volleyball athletes ($P < 0.05$). Twelve of the taekwondo (24%), 16 of the handball (26%) and four of the volleyball athletes (8%) experienced at least one type of dental injury. Awareness of mouthguards as a preventive measure against dental trauma was significantly higher among taekwondo and handball athletes ($P < 0.05$), although a very small percentage in either of these sports actually wore a mouthguard (10 and 0%, respectively). This study concluded that the incidence of dental trauma in contact sports shows that the awareness and use of mouthguards must be intensified. Mouthguard use should be made compulsory, especially in those sports with high risk for dental trauma.[29]

Cohenca N et al (2007) conducted a study to report the incidence and severity of dental trauma among the student athletes who participated in intercollegiate sports at the University of Southern California, Los Angeles. The authors classified each injury and determined the severity of the injury.

Severity was defined in relation to the treatment required and the prognosis of the teeth and supporting tissues involved. The data was analysed and the results showed that 51 traumatic dental injuries were reported during the 10 year period. Basketball was the sport with the highest injury rate; it had an incidence rate (IR) of 10.6 injuries per 100 athlete-seasons among men, and an IR of 5.0 injuries per 100 athlete-seasons among women. The incidence rate for men's basketball players was five times higher than that for football players for whom mouthguard use is mandatory. They concluded that given the relatively high incidence of dental injury in basketball and the possibility of long- term follow -up treatment needs combined with the potential of mouthguard use to reduce the incidence and severity of the trauma, the mandatory use of mouthguards among collegiate basketball players should be considered and the dental professionals have a responsibility to educate patients and the public about the importance of using mouth-guard protection in contact sports.[30]

Spinas E, Savasta A (2007) conducted a study on prevention of dentoalveolar traumas and the lack of knowledge and use of protective oral devices practicing sports with a sample of 300 children between 8 and 11 years of age practicing basketball at the oro-facial trauma centre of university of Cagliari & assessed the frequency of oral trauma, correlated predisposing factors, level of knowledge of mouth guards and possible frequency of use of such devices. From the study it was found that only 30 subjects (10%) actually

knew about mouthguard, among which 15 received the information from their dentist; none of the participants had ever received information by the coach or within the sport group. Finally, 30 subjects (15 males and 15 females) that agreed to cooperate, were provided with preformed mouthguards (boil and bite of new generation), to be used both during training sessions and official games. After three months of use, only 3 athletes (all males) ceased to wear such protections ascribing their choice to breathing difficulties or perioral muscle soreness; the remaining 27 young athletes showed good acceptance of the mouthguards and expressed willingness to keep using the devices. They concluded that there is an absolute need of providing information about the risks of oro-facial trauma related with contact sport activities and to promote the use of mouthguards as a primary protective measure among athletes which will considerably reduce the social costs associated with such trauma occurrences.[31]

Duarte-Pereira et al (**2008)** conducted a study to measure the comfort, wearability, physiological effects and its influence on athletes' physical performance, of custom-fitted compared with self-adapted mouthguards. Eleven rugby players were put under specific efforts similar to those of the competition. Each player made three consecutive tests randomly wearing a commercially available 'boil-and-bite' self-adapted mouthguard (MG2), a custom-fitted mouthguard (MG3), and no mouthguard. Forced expiratory air volume at 1 s (FEV1), expiratory flow rates peak (PEF), forced vital capacity

(FVC), rebound (RB) jump 15 s, and counter-movement jump (CMJ) were measured on each player before and after the training exercise tests. Subjective evaluations by means of a visual analog scale (VAS) questionnaire took place. Comforts, adaptability, stability, tiredness, thirst, oral dryness, nausea, ability to talk, breathe, and drink were evaluated. Results showed that the wearing of the self-adapted MG showed significant improvement in PEF ($P < 0.05$). There were no statistically significance differences regarding the others spirometer parameters. In counter - movement jump, there were no differences between both the mouthguards. On rebound power was similar with both mouthguards and control. However, rebound jump height reduced significantly wearing mouthguards. Custom-fitted mouthguards showed superior properties in comfort, adaptability, stability, and ability to talk and to breathe. They concluded that custom -fitted mouthguards showed the smallest range of changes in players' performance, suggesting improved fit, comfort, and acceptation compared with 'boil and bite' self adapted mouthguards. Furthermore, its greatest advantage is the individualized design according to the proper anatomy of the oral cavity. Greater efforts must be made to improve the comfort of mouthguards if their use is to be increased.[32]

Kinoshita-kawano S et al (2008) did a study to assess the knowledge and attitudes among guardians and children in Japan about tooth injuries, the management of avulsed teeth, and mouthguards. An 18 set of questionnaire (3

general items about tooth injuries, 8 about the management of avulsed teeth and 7 about mouthguards) was distributed to 256 guardians and 92 children at the Pediatric Dental Clinic of Niigata University Dental Hospital. One-third of the respondents reported having had a tooth injury, but most had never been advised about the importance of emergency management in dental injuries. On the other hand, 185 guardians (72%) but only 21 children (23%) indicated an interest in taking an educational course about dental injuries. Approximately 75% of the respondents did not know that avulsed teeth could be replanted. Moreover, less than 20% knew that the best way to store avulsed teeth at home was to soak them in milk. Forty-five percent of those with this knowledge had obtained the information from TV programs, whereas only 10% received it from their dentist. As to mouthguards, while nearly 70% of the respondents knew what mouthguards are, only 13% of the children planned to use a mouthguard while playing sports, whereas 30% of the guardians reported that they would require their children to wear one during sports. This study concluded that there is a need for educational campaigns to increase lay people's knowledge of emergency treatment for avulsed teeth and to encourage children to use mouthguards while playing baseball and basketball.[33]

Andrade RA et al (2010) conducted a cross-sectional epidemiological survey to assess the prevalence of dental trauma in athletes representing 42 countries competing at the most recent Pan American Games (XV Pan Am)

held in Rio de Janeiro, Brazil in July of 2007, and to determine prior use and type of mouthguard among this group of athletes. The examiners participated in standardization and calibration training sessions before the field phase began. Invitations were sent to >5500 participating athletes competing in 41 sports and to the Medical Committee of the Pan American Sports Organization before and during the XV PAN. A convenience sample of 409 athletes was recruited. After signing an informed consent, all athletes answered a questionnaire. Data were collected at the clinical examination and recorded on a specific trauma form. The mean age of the athletes was 24.4 ± 5.3 years. Males comprised 55% of the sample; females 45%. The results showed that prevalence of dental trauma among the athletes was 49.6% (n = 203) with no gender-based differences. Most of these injuries (63.6%) were related to activities during training or competition. Sports with the highest injury prevalence were wrestling (83.3%), boxing (73.7%), basketball (70.6%) and karate (60%). The most common injury was enamel fracture (39.8%); root fracture was the least common (0.4%). The teeth most affected were the maxillary permanent central incisors (n = 113), followed by the mandibular central incisors (n = 19). Based on the results of this study, nearly one-half of the subjects had experienced previous dental trauma; the majority related to sports activities. Furthermore, only 17% of the athletes reported prior mouthguard use; the most frequent mouthguards reported were boil-and-bite. From the results obtained they suggested the importance of

enhanced educational efforts and the use of properly fitted mouthguards to reduce dental trauma among athletes in international sports competition, especially in sports where mouthguards are not mandatory.[34]

Frontera RR et al (2011) conducted a study to assess the orofacial trauma history in basketball players, in relation to wearing mouthguards, facial types, presence of mouth breathing and player's position in the game and also to check athletes' level of knowledge about trauma and mouthguards. Questionnaires were given to category A-1 adult athletes registered in 2006/07 in the State of Sao Paulo and Brazilian Basketball Confederation Championships, and National Team members. Results showed that of the total sample (n = 388), 50% of athletes sustained oro-facial injuries and dental trauma accounted for 69.7%, with emphasis on maxillary central incisors, followed by soft tissue (60.8%), in which lip injuries were the most prevalent. No relationship was found between trauma history and player's position (P = 0.19), facial type (P = 0.97), presence of mouth breathing (P = 0.98), but there was statistically significant association between the prevalence of oral trauma and lack of mouthguard use (P £ 0.0001). Of all the athletes affected, only 1% wore a mouthguard at the time of the trauma, 26.5% did not know about the mouthguards and 10.6% did not know their functions. When trauma occurred, 79.6% replied one must look for the tooth at the accident site, 50% knew it must be stored in liquid, as replantation was possible (62.3%) and 75.8% believed

elapsed time could influence prognosis. Hence, they concluded that Basketball is a high impact sport with high prevalence of oral trauma, particularly maxillary central incisor and lip injuries, but athletes did not use mouthguards. So they stated that there should be more educational campaigns to inform players about oro-facial injuries and their prevention in Brazilian basketball.[35]

Dua R, Sharma S (2012) conducted a study to assess the prevalence of traumatic dental injuries(TDI) in children of age group 7-12 years in private schools in Gulabgarh village. 880 children, (495 boys and 385 girls) belonging to the middle and low income groups were included from private schools in Dera Bassi. Age, sex distribution, etiological factors, risk factors and cause of injury were the parameters taken into consideration. The overall prevalence of dental trauma was 14.5%, among the 880 subjects examined, out of which 63.2% males and 36.4% females were found o be affected. The maxillary central incisor was found to be most commonly affected tooth (43.8%). The most common cause of injury reported was fall during playing (37.5%). Enamel fracture was most prevalent (50%). The study concluded that higher prevalence of injuries occurred at home compared to school and more injuries occurred due to fall while playing. Children with Angles class II div I malocclusion was seen as a major risk factor among affected children.[36]

O'Malley M et al (2012) conducted a study to determine the extent of mouthguard use, dental trauma and barriers to use among children. It also

investigated the policies of school and sports clubs in relation to the prevention and management of dental injuries in sport. A questionnaire was sent to parents of 1,111 children aged 9 to 13 years from 25 randomly selected schools in the Health Service Executive West region of Ireland. The questionnaire sought information about children's sporting activities, mouthguard policy and use, barriers to use, and dental accidents. Among the 1,111 only total of 505 questionnaires were filled and returned (46%). More than nine out of ten children were involved in sport. Mouthguards were worn by 22% of children during sport. Less than one-third of schools and sports clubs that children attended had a mouthguard policy. Significantly more children used mouthguards where there was a mouthguard policy. Reasons for not wearing mouthguards included cost, lack of knowledge and information, and lack of a mouthguard policy. One in ten children had suffered a sports accident in the previous year, of which 51% injured teeth. Of these, 72% visited a dentist within two hours. They concluded that the dental profession and individual practitioners should promote mouthguard use for children during sport and be advocates for the development of policies in schools and sporting organizations.[37]

Tin-Oo MM, Razliza Razali (2012) assessed the awareness and usage of mouthguard and occurrence of sports-related oral injuries in athletes who involve in various sports activities in Kota Bharu. A cross-sectional study was

carried out among 180 athletes aged 12 to 27 years. A structured questionnaire was used to determine the prevalence of oral injuries sustained during sport activities, the use of mouthguard as well as its awareness. The results showed that the respondents consisted of 107 males (59.5%) and 73 females (40.5%) with a mean age of 16.7 years (SD 5.53). There were 60 (22.2%) athletes who had one or more types of sports-related oral injuries sustained. Laceration of lips, tongue and gums were the most frequent injuries (57.5%) while loosening of teeth and fracture of teeth sustained in 12.5% and 10.0% of athletes respectively. Malay traditional martial arts silat athletes 17(68.0%) experienced the highest oral injuries among athletes. The prevalence of oral injuries was significantly different between ball sports, martial arts and other non-contact sports (p=0.002). Sixty-one athletes (33.9%) reported that they were aware of mouthguard; however none of the athletes used the mouthguards during their sports activities. They concluded that the malay traditional martial arts silat was the most common susceptible to sustain oral injuries. None of the athletes were wearing mouthguard. Education on prevention of oro-facial trauma should be given to the coaches and athletes. Wearing of mouthguard during sport activities should be compulsory during practice and competition events.[38]

Abudullah D et al (2013) conducted the study to assess the knowledge, habit and preferences of using mouthguards among university athletes. Athletes who were university students between 18 - 30 years of age and were included in

the study. Self-administered questionnaires, consisting of Part A - Age, gender, type of sporting activities, total hours dedicated to sports training, level of sports representation; Part B - Awareness of risk of dental injuries, knowledge on mouthguards such as definition of a mouthguard, role of mouthguard, use of mouthguards and reasons for not wearing mouthguards; and Part C – Experience of sustaining dental injuries during sports activities, were distributed. Results showed a total of 225 respondents were analysed, consisting of 68% (n=154) male and 32% female (n=71) with the mean age of 21 years old. Only 46% (n=104) knew exactly about mouthguards and its role in the prevention of dental injuries during sports. 37% of them (n=84) have used mouthguards and they were mostly in the martial arts group. 40% of the respondents (n=91) claimed to have sustained dental injuries while playing sports and the injuries occurred more frequently in hockey (65.3%), basketball (60%) and soccer (45.2%). Hence the study concluded that the incidence of dental trauma in contact sports showed that the awareness and use of mouthguards must be intensified and suggested that awareness campaigns focusing on dental trauma should be organized to improve the knowledge of athletes.[39]

Costa Palau S et al (2014) conducted a study to assess the incidence of dental injury, the level of knowledge about mouthguards, their relative importance and the use of mouthguards among athletes in Barcelona, Spain,

according to age and sport. A total of 127 athletes (mean age, 33 years; range, 16–50 years) from different sports (15 rugby, 51 field hockey, 20 trial, 17 kickboxing, 12 handball, and 12 taekwondo athletes) were distributed with a 25 set of questionnaire concerning their opinion and use of mouthguards. For some parameters, a visual analogue scale (0–100 mm) was used. Parameters were compared relative to the age and sport of the athletes. Results showed that more than half of the athletes (62.42%) reported that they used mouthguards. About 80% of athletes identified a lack of information regarding the properties and benefits of mouthguards. The main drawback to mouthguard use was difficulty in breathing (60%). Price was the main consideration in mouthguard choice for users of prefabricated or boil-and-bite mouthguards. Even though they used custom-made mouthguards, there was a lack of information regarding their fabrication adaptation and function from the dentist was the main drawback. Athletes with no dental trauma history and younger athletes ascribed lower importance to mouthguard use. The most important finding of this study was the lack of information among athletes in various disciplines concerning the types of mouthguards. They concluded that athletes and health professionals should receive training and comprehensive educational materials on oral protective devices to improve the knowledge regarding the use of protective mouthguards.[40]

Dhillon BS et al (2014) emphasized about the orofacial injuries sustained during sports and the options available to the athletes for their prevention. It was done with a purpose to determine three different aspects: incidence of dental injury during sporting activities, role of mouthguards in preventing sports injury, types of mouthguards and their properties. From this review, it is clear that sports carry a considerable risk of injury, this is not only true for the contact sports such as rugby or kickboxing, but also for seemingly less dangerous sports such as football. Amongst the different types of mouthguards, the most acceptable and safe ones are the custom- fabricated mouthguards, in particular the pressure-laminated type. He stated that the need for the use of mouthguards should be emphasized and promoted by the dental profession.[41]

Ilia E et al (2014) conducted a study to assess the prevalence of oro-dental trauma and the importance of mouthguard usage among 225 amateur rugby players. A detailed questionnaire was given to all the participants that included relevant information like, oro-facial & dental trauma, dental injury risk rating associated with their sport and mouthguard utility. The results showed that 64.9% prevalence of oro – facial trauma was noticed among the rugby players and 44.5% had laceration of intra and extra oral soft tissues. 41.9% injuries were associated with dentition of all the oro – facial injuries. Regarding mouthguard utility, 97.3% recognized the importance of wearing a mouth guard

whereas only 76.9% of the population wore mouthguards. By wearing a mouthguard the risk reduction for on-going complications following dental injuries was 18.5%. Of these, 10.4% represented the loss of tooth. From the results, it was concluded that the rates of oro-facial trauma and complications in amateur rugby union players are high in Australia and the use of mouthguard results showed significant risk reduction for complications following dental injuries, including loss of tooth. The author concluded that wearing of custom made mouth guards must be made obligatory.[42]

Mantri SS et al (2014) discussed on the role of Intra-oral Mouth-Guard in Sport Related Oro-Facial Injuries. They stated that Sports dentistry is a composite of skills for treatment, prevention, education and research in which dentistry and sports come together. Custom athletic mouth guards present additional health-care opportunities that are designed to reduce the impact force of a direct blow to the jaw and create a gap between the condyle and skull thereby reducing the transference of the impact to the brain. They emphazised that prevalence and severity of injuries to the teeth, jaws and intra-oral and peri-oral soft tissues, concussions and neck injuries are reduced when mouth guards are used and the dentist should play a proactive role in helping to deliver important expanded health care services.[8]

Neeraja et al (2014) conducted a study to determine the knowledge, attitude and practices of physical instructors in Bangalore, regarding oro-facial

injuries and oro-facial protective devices. A self-completion questionnaire was sent to 50 physical instructors of schools, sports academies and gymnasiums situated in the South of Bangalore city which included the information about the knowledge of the incidence of oro-facial injuries, common sports causing oro-facial injuries and oro-facial protective devices and their role in the prevention of injuries. It was distributed to the population which comprised of 92 males and 8 females. The results showed that the physical instructors had knowledge regarding oro-facial protective devices like mouth guards (54%) and helmet (40%). The attitude and practice regarding the usage of mouth guards was found to be minimal. The physical instructors had knowledge especially through the media on the protective effectiveness of mouth guards in reducing the orofacial injuries. Despite their awareness, only 4% of them recommended the mandatory use of the mouth guards. Majority of them could not recommend its usage as they were unaware of its availability and the reason for not using the mouthguards because of its improper fitting. Hence the present study suggests the need for educating the physical instructors, as they would like to have adequate information on mouthguards.[43]

Soares PV et al (2014) discussed in detail about Sports Dentistry (SD) including definition, the prevention, maintenance and treatment of oral and facial injuries, as well as the collection and dissemination of information on dental trauma. This is based on the provided data from the literature related to

sports dentistry, to discuss the data, six areas were categorized: shares in sports dentistry; oral health of athlete; sports-related dental implications; dental-facial trauma; face shields; and mouthguards. The analyzed data showed that the sports dentistry is still an under explored field of action by dentists, but it is expanding, despite not being recognized specialty by the Federal Council of Dentistry, but the Brazilian Academy of Sports Dentistry has been created with a mission to show the real importance of Dentistry in sport. They stated that dentist should be part of the group of professionals associated with the athlete to perform periodic checks in order to ensure oral health which may contribute to athletes´performance. When impact occurs, however, it would be possible to reduce the severity of the impact related to injuries, by using helmets, masks, goggles, face shields and mouthguard. [44]

Spinas E et al (2014) conducted a study to assess the use of mouthguards in basketball players with and without motivational reinforcement regarding mouthguard protection. The study included two groups of adolescent basketball players (150 athletes aged between 12 and 15 years) who accepted to use a custom-made mouth guard during their sport sessions. None of the selected athletes had ever worn a mouthguard during their sports activity. A customized mouthguard was supplied, and subjects were requested to wear it for 12 months during training sessions and competitions. The study group was composed of 30 athletes, 15 males and 15 females, who received a constant

motivational reinforcement to the use of the mouth guard by their coach and during checkups. Similarly, the control group was composed of 30 athletes (15 males and 15 females) who did not receive any motivational reinforcement. Results showed that twelve months after the beginning of the study, 24 subjects belonging to the control group were not using the mouth guard, while only 7 subjects of the study group were not using it. It was also noticed, six months after the beginning of the observation period, a rapid decline in the participants' interest in the use of the mouth guard. Finally the study concluded that no traumatic event was registered among those adolescents who had used the mouth guard for the whole period of the study. It is important that all staff members, particularly the leading coach should encourage the regular usage of oral protection devices for prevention among teenagers practicing sports.[45]

Tiwari V et al (2014) investigated the associations of mouthguard awareness and use with the rate and type of oro-facial trauma during sports activities among professional athletes in Bhopal city. This study included 50 athletes (25 contact & 25 non contact sports) aged between 12 to 22 years who were trained for participation in national and international competitions. The data were collected by using a questionnaire that included demographic data, history of soft and hard tissue injury, mouthguard usage and a clinical examination that included Ellis classification to assess the dental injury. The study stated that there were significant differences in mouthguard awareness,

use and injury rates, i.e., athletes who did not wear mouthguards had more injuries. Traumatic injuries to teeth were significantly more frequent among contact athletes (15; 9%) than among non-contact athletes (4; 2.5%). The study concluded that the limited mouthguard awareness could be due to lack of information and education on dental injuries and their prevention.[46]

Vashisth S et al (2014) assessed the prevalence of traumatic injuries and the knowledge regarding the emergency care among school children in rural area Dehra, Kangra district, Himachal Pradesh. A cross-sectional survey was carried out in 13 government schools among 1041 subjects aged 11- 14 years. The demographic details and knowledge regarding emergency care was recorded on a structured questionnaire. The data regarding the traumatic injuries was recorded using modified Ellis' classification. Results showed that prevalence of Traumatic Dental Injuries (TDI) was 5.12 %. Maxillary central incisor was the most common tooth to be affected (58.1%). The main cause for TDI was found to be due to fall (51.2%) and 46.7% was enamel, dentin fracture with pulpal exposure. The awareness regarding emergency care revealed that 63.4% of subjects were aware of emergency care. This study concluded that the knowledge regarding TDI increased with increase in age. The prevalence of dental trauma was found to be low and the awareness level regarding emergency care was found to be fair. Hence it is highly recommended to plan a

community wide trauma prevention campaign targeting parents, children and dental care providers.[47]

Dursun E et al (2015) conducted a study to determine the prevalence of dental trauma and knowledge of traumatic dental injuries among weekend warriors in Ankara, Turkey with the help of a detailed questionnaire on mouthguard awareness and knowledge and experience of dental trauma was distributed to 1,007 weekend warrior athletes participating in a soccer tournament. The results showed that 9.8% of participants had experienced oro-facial trauma, 21.7% were aware of mouthguards, 2.9% reported using mouthguards, 15.4% were aware of the field of sports dentistry, and 19.6% were aware of emergency treatment for dental trauma. Participation in sports, especially contact sports, greatly increases the risk of dental injury. From the results they concluded that the knowledge of traumatic oro-facial and dental injuries is limited among weekend warriors. Public health authorities should develop relevant educational programs, including broad dissemination of information on the risks of traumatic dental injuries and methods for protection against such injuries.[48]

Al-Arfaj I et al (2016) conducted a study to evaluate the knowledge, attitude, and practices of male sports participants concerning sports-related dental trauma and associated emergency measures. The study included 124 male subjects over 18 years of age participating in contact and non-contact

sports from three clubs in the Eastern Province, Saudi Arabia. A questionnaire was used to assess past experience of dental trauma related to sports in addition to the use of a mouth guard and knowledge of related emergency procedures. Outcomes were compared between individuals practicing contact and non-contact sports. One third of the participants had experienced dental trauma while playing sports, mostly crown fracture, mobility, and avulsion were reported. Their knowledge about emergency procedures was inadequate. A significantly higher proportion of non-contact sport participants sought the help of a dentist for themselves or others (P = 0.04 and 0.003, respectively). Only 33.9% participating in direct contact sport used mouth guards. This study concluded that educational programs are necessary to increase the awareness in sports participants about the risk of dental trauma to improve their knowledge of emergency procedures and to increase the use of mouth guards.[49]

Antunes Livia Azeredo et al (2016) conducted the study to evaluate the knowledge and attitudes in a group of Brazilian physical education undergraduate students in relation to dental trauma and use of mouthguard. A total of 373 undergraduates from three public universities of Rio de Janeiro were interviewed by means of a semi-structured standardized questionnaire. The data was analysed and the results showed that only 3.21% of the interviewers had been known about the information on dental trauma and use of mouth protector during their undergraduate course. With regard to their

attitudes, only 19.83% responded correctly about how to react towards a situation of tooth avulsion; 54.69% about how to manage the avulsed tooth, and 7.77% about the transport media for an avulsed tooth. By comparing these attitudes in relation to the undergraduate period (before or after the 5th semester), previous information and experience on dental trauma, it was observed no significant difference ($p > 0.05$) was found. With regard to prevention, 89.81% knew mouthguard although only 17.96% used it during sport activities. The students were given no information during their under-graduation course, even though the curriculum has the discipline of first aid. The study concluded that the dentist are supposed to develop knowledge regarding mouthguards and emergency management of dental trauma among the physical education practitioners.[50]

Deogade et al (2016) reported dental and oro-facial injuries to be the most commonly occurring form of traumatic injury resulting from sport-related activities. He emphasized that sports dentistry is the upcoming field which is associated with the diagnosis, prevention and treatment of oro-facial injuries and related oral diseases. It also deals with the collection and dissemination of information on dental athletic injuries and the encouragement of research in the prevention of such traumatic injuries. An overview of sport-related injuries in oro-facial and dental region, incidence, evaluation, treatment and their prevention, and also the several functions and types of mouthguards has been discussed. It also stressed the prime role of dentist in educating the general

public, parents/guardians, staffs of emergency department, coaches and athletes regarding health risks and benefits of mouthguards including the importance of emergency care for orofacial injuries.[51]

Gawalak et al (2016) conducted a clinical study to compare the effects of various custom mouthguards with generally available standard boil and bite mouthguards on the functions of the oral cavity. A total of a 168 mouthguards (five types of custom-made and three types of boil and bite mouthguards) were assessed by a questionnaire-based survey. Their effects on the integrity of mucosa, speech, breathing, salivary flow and taste inducing gag reflex, tooth clenching and temporomandibular joint complaints were compared and results showed that Porida mouthguard was found to have the most adverse effects on oral functions. In the majority of the respondents who were using other types of mouthguards did not have any adverse effects on the stomatognathic system functions. From the results it was concluded that fabrication of mouthguards for each athletes seems to have better adaptation and usage during sports activity.[52]

Materials and Methods

MATERIALS AND METHODS

The present study was carried out among 160 athletically active children of 6-12 years age participating in sports like Boxing, Football, and Martial arts (Karate, taekwondo, judo) to assess their attitude, awareness and acceptance of protective devices like Mouth guards in preventing sports related traumatic injuries.

Source of data:

The study was carried out among 160 children aged 6-12 years of both genders from various sports academies practicing sports like Boxing, Football and Martial arts (Karate, taekwondo, judo).

Selection of sample:

Initially children who were enrolled in various sports academies in and around Chennai and practicing sports like Boxing, Karate, Football, taekwondo and judo were examined. Among them 160 children were selected for the present study on the basis of inclusion criteria. The coaches in the above mentioned academies provided the necessary information to select athletically active children involved in these competitive sports activities.

Inclusion criteria:

- Children of age group 6 -12 years.
- Healthy and athletically active children who are playing the sport for more than 1 year.
- Children willing to participate in this study

Exclusion criteria:

- Children who were not willing to participate in the study
- Children with special needs, development delays or debilitating diseases

Armamentarium:

- Mouth mask
- Gloves
- Mouth mirror
- Explorer
- Digital camera
- Two sets of questionnaire with close-ended questions
- Semi-individual type mouthguards
- Water boiling kettle

Method of data collection:

Ethical clearance was obtained from institutional review board (IRB) after which the aim and objective of the study was explained to the academy coaches, parents and children. Permission and Informed consent was obtained from the coaches and parents of the selected children.

Each child of the sports academy who was willing to participate in the study underwent complete physical and oral examination and was asked for any history of oral trauma or loss of consciousness while participating in sports. The children with a history of previous oral trauma were asked about the type and location of the injury, the sport during which the injury occurred and whether the athlete was wearing a mouth protector at the time of injury. The oral examination was performed with mouth mirror, probe and artificial light. Both hard and the soft oral tissues were examined to identify caries, tooth fracture, malocclusion, oral hygiene or anyother findings that could affect the child's performance in practicing the sport were noted down.

A questionnaire (Annexure I) was distributed to all the selected children who participated in competitive sports and they were assisted to fill the questionnaire. The questionnaire contained certain set of questions which included name, age, sex, address, questions regarding sport participation, period of time the child has been practicing the sport, whether the sports activity was supervised by a coach and about the risk involved in the game they played. Information regarding awareness of dental injuries, emergency management during sports, the awareness of first aid measures to prevent dental injuries, incidence of personal injury, awareness of mouth guards used in prevention of sports related injuries, and their willingness to use a mouthguard while playing sport was assessed.

From the responses received the children who were already using a mouthguard in their sport for atleast a period of 6 months were provided with

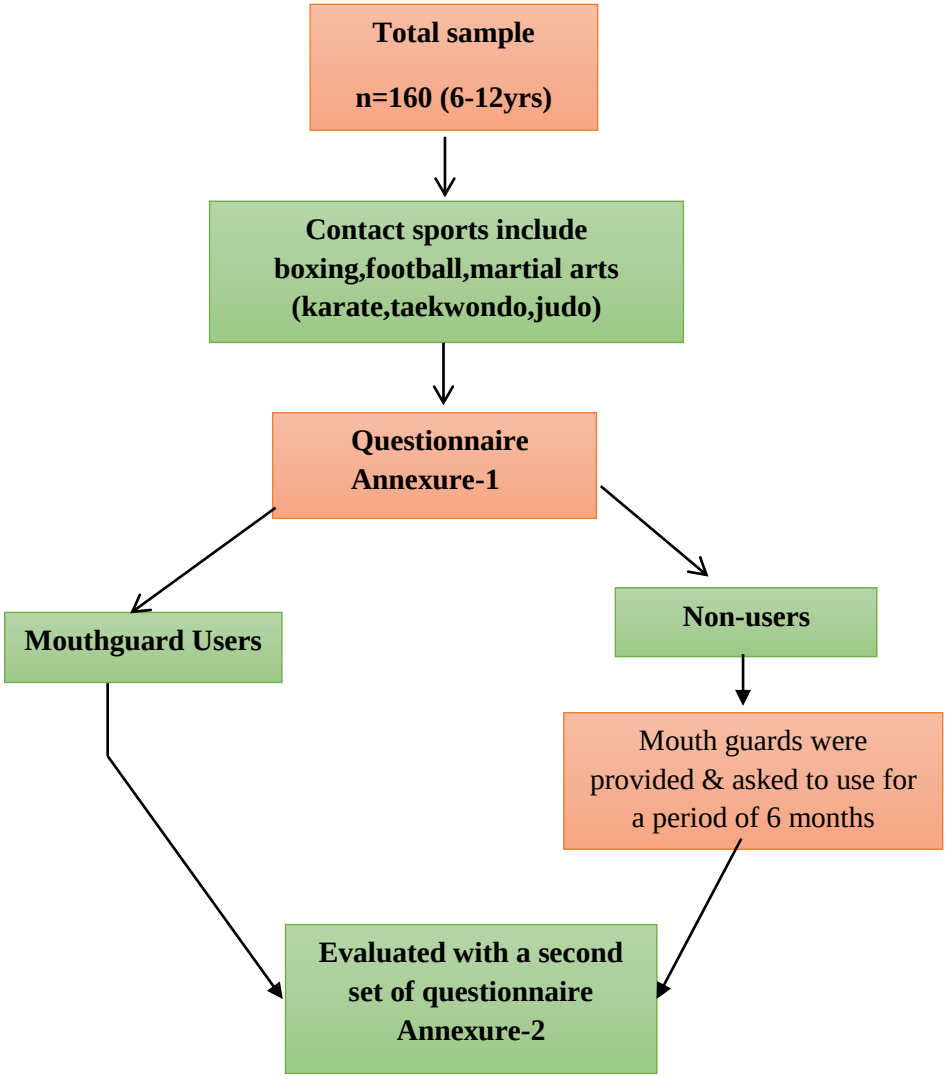
a second set of questionnaire to assess the effectiveness, comfort of mouthguards, their acceptability, whether mouthguards could prevent oral injuries and willingness to continue the use of mouthguards in their sport for preventing sports related dental injuries. The children who were not using a mouthguard during their sports activities were provided with a semi-individual type (boil and bite) mouthguards which were similar to those used by the other group. They were asked to use it while performing their sports activities for a period of six months after which they were also provided with the second set of questionnaire. This final set of 7-item questionnaire was used to assess the effectiveness and acceptabiliy of mouthguards in the prevention of sports related oro-facial injuries.

Method of statistical Analysis:

The data obtained from the questionnaire were entered into MS Excel 2007 for evaluation. All relevant data were used for qualitative analysis. The quantitative data was analysed using SPSS, statistic software.

The frequency proportions were compared using Chi-square ($\chi 2$) test of significance. Proportion of students' response to each question was expressed in absolute number and percentage. In the above test P value < 0.05 were considered statistically significant.

METHODOLOGY OVERVIEW



Figures

FIGURE 1: ARMAMENTARIUM

FIGURE 2: CHILDREN ANSWERING QUESTIONNAIRE

FIGURE 3: CHILDREN WEARING MOUTHGUARD

FIGURE 4: CHILDREN PRACTICING TAEKWONDO

FIGURE 5: CHILDREN PRACTICING BOXING

FIGURE 6: CHILDREN PRACTICING FOOTBALL

FIGURE 7: CHILDREN PRACTICING KARATE

Results

RESULTS

1.DISTRIBUTION OF THE STUDY POPULATION

GENDER DISTRIBUTION

Table 1 shows the gender distribution of the study population with a male predominance of 129 children (80.6%) compared to the 31 female children (19.4%).

On evaluating the participation in various competitive sport activities among the selected 160 athletically active children, 40(25%) of children participated in boxing, 20(12.5%) of children practiced football and 100(62.5%) practiced martial arts.

Among the 100(62.5%) children practicing martial arts 40(25%) practiced karate, 40(25%) taekwondo, 20(12.5%) judo .Among the 40 children who practiced boxing 35(87.5%) were boys and 5(12.5%) were girls, among the 20 football children 16(80%) were boys and 4(20%) were girls, among the 40 karate children 36(85%) were boys and 4(10%) were girls, among the 40 taekwondo children, 25(62.5%)were boys and 15(37.5%) were girls, among the 20 judo children 17(85%) were boys and 3(15%) were girls.

2. EVALUATION OF SPORTS PARTICIPATION

A. DURATION OF SPORTS IN YEARS

Table 2 shows the duration of sport practiced, with 104(65%)of the children playing for a period of one year, 29(18%) of the children playing for a period of 2 years and 27(16.9%) of the children playing for a period of more than 3 years.

B. SUPERVISION BY COACHES

Pie chart 2 shows that all the sports were played under the supervision of the coaches.

3.KNOWLEDGE REGARDING RISK ASSOCIATED IN THE SPORTS PLAYED

Table 3 shows the knowledge and risk associated with the sports played, with 59.4% of the children having a knowledge regarding it.

Among the total of 160 children, 95(59.4%) felt that there was a risk of injury in their activities and 65(40.6%) felt they do not have any risk of injury.

22(55%) of children practicing the sport boxing, 12(60%) of children practicing football and 61(61%) practicing martial arts have revealed their fear for risk of injury to their teeth during the sports participation. From this data it can be derived that the children practicing martial arts felt that they had a higher potential of risk to orofacial region in their sports.

4. KNOWLEDGE REGARDING THE COMMON INJURIES ONE MIGHT ENCOUNTER WITH IN VARIOUS SPORTS

Table 4 Overall evaluation regarding knowledge about the common injuries that can be encountered showed that most of the children 72(45%) felt that facial injuries were a common occurrence followed by leg injury 52 (32.5%), hand injury 24(15%) and others 12(7.5%). According to the sport played by the children boxing and martial arts groups felt that facial injuries will be predominant, whereas the football group (65%) felt that leg injuries were more common.

5. KNOWLEDGE REGARDING FIRST AID MEASURES AND EMERGENCY CARE

Table 5 shows that nearly 115(71.9%) of children would visit a dentist in case of tooth related emergencies compared to 30(18.8%) who replied that they would visit a general physician and 15(9.4%) replied that they would use an emergency kit.

6. AWARENESS OF MOUTHGUARDS

Table 6 shows the awareness regarding mouthguards among the children, in which 46(28.75%) of the children were unaware regarding the use of mouthguards compared to the 114(71.25%) children who were aware about it.

Awareness of mouthguards in protection of dental trauma was more in the children practicing boxing (100%).

7. SOURCE OF INFORMATION REGARDING MOUTHGUARDS

Graph 6 shows that among the 114 children who were aware of mouthguards, 82 (72%) of the children got the source of information regarding the role of mouthguards in prevention of the orofacial injuries from the coaches and the remaining 32(28%) children obtained the information from the mass media.

8. PARTCIPANTS USING MOUTHGUARDS

Table 8 shows among the total population 49(30.62%) were already using mouthguards and 11 (69.38%) were not using mouthguards. In the boxing group all 40 (100%) of the children were already using mouthguards, in the martial arts group only 9 (9%) of the children were using mouthguards and in the football group no one was using a mouthguard before.

9. WILLINGNESS TO USE MOUTHGUARDS

Table 9 shows the willingness among the children to use the mouthguards. All the 160 children (100%) of the children showed willingness to use mouthguards.

10. REGULARITY IN WEARING MOUTHGUARDS

Table 10 shows the regularity of mouthguard usage among the study population with a majority of the 142 children (88.75%) regularly using the mouthguards in comparison to the 18 children (11.25%) who occasionally used them.

11. EFFECTIVENESS OF MOUTHGUARD IN PREVENTION OF OROFACIAL INJURIES

Table 11 shows the effectiveness of mouthguards in prevention of injuries, 142(88.75%) of the population believed that use of mouthguards prevented orofacial injuries as they were regularly using them during them during their sports activity.

12. INCIDENCE OF OROFACIAL INJURY DURING SPORTS ACTIVITY WITH AND WITHOUT MOUTHGUARDS

Table 12 shows the incidence of injury during sports activity. Only 5(3.12%) among the 160 children sustained an orofacial injury without a mouthgaurd in comparison to 155(96.8%) children who were free of trauma. After intervention and with the use of mouthguards no one sustained an orofacial injury.

13. COMFORT OF MOUTHGUARD

Table 13 shows that nearly 142(88.75%) of the children felt comfortable using mouthguards compared to 18(11.25%) who were not comfortable with its use.

14. WILLINGNESS TO CONTINUE USING THE MOUTH GUARD

Table 14 shows the willingness to continue using mouthguards, 142 children **(**88.75%) of the respondents stated that they would continue to use the mouth guard compared to the 18 children (11.25%) who were not willing to continue its use. All the children practicing boxing and martial arts are willing to continue using mouth guard as a protective device. But 12 children (60%) who were practicing football did not want to continue using mouthguard.

15. RECOMMENDATION OF THE MOUTHGUARD TO OTHERS

Table 15 shows the willingness of the children to recommend mouthguards to others.

The 142 children (88.75%) of the respondents who were willing to continue using mouth guard as a protective device were also willing to recommend them to others. While the remaining 18 children (11.25%) said they would not recommend the use of mouth guards to others.

Tables and Graphs

TABLE 1: DISTRIBUTION OF THE STUDY POPULATION

Type of sport		SEX		Total
		F	M	
BOXING	n	5	35	40
	%	12.50%	87.50%	100.00%
FOOTBALL	n	4	16	20
	%	20.00%	80.00%	100.00%
MARTIAL ARTS	n	22	78	100
	%	28.00%	78.00%	100.00%
Total	n	31	129	160
	%	19.40%	80.60%	100.00%

The present study findings showed a predominant male participation in sports activities with 129 male children (80.6%) compared to the 31 female children (19.4%).

PIE CHART 1: GENDER DISTRIBUTION OF THE SAMPLE

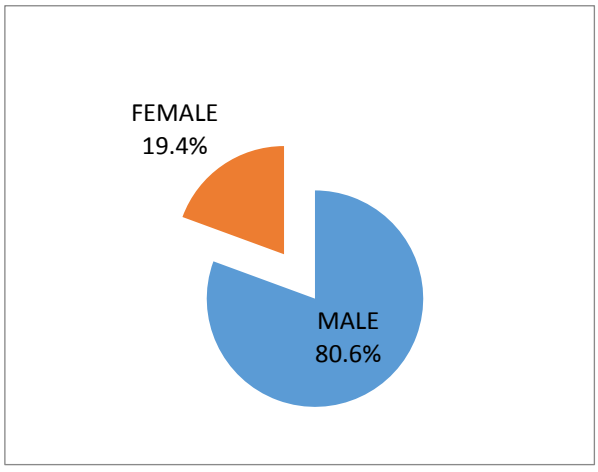
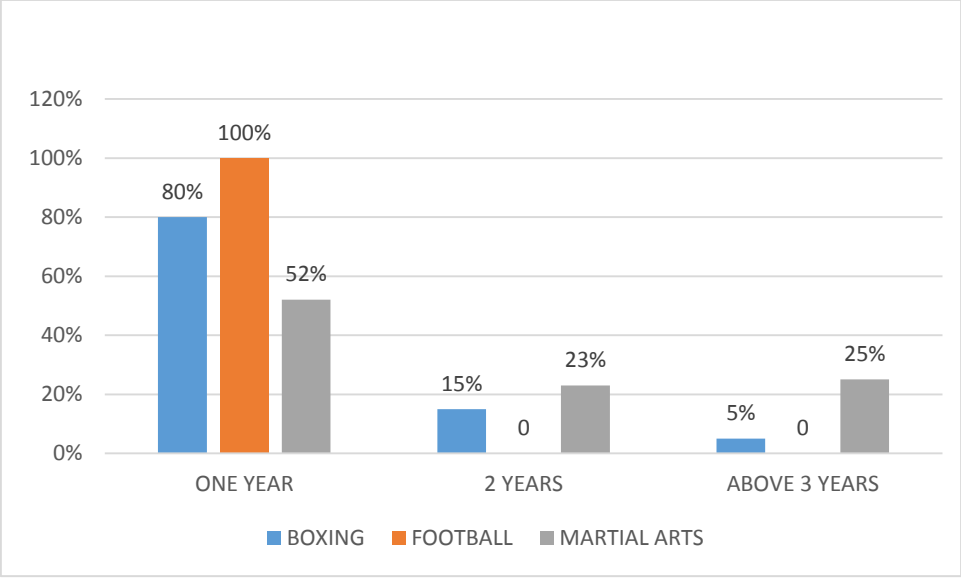


TABLE 2: DURATION OF SPORTS PARTICIPATION IN YEARS

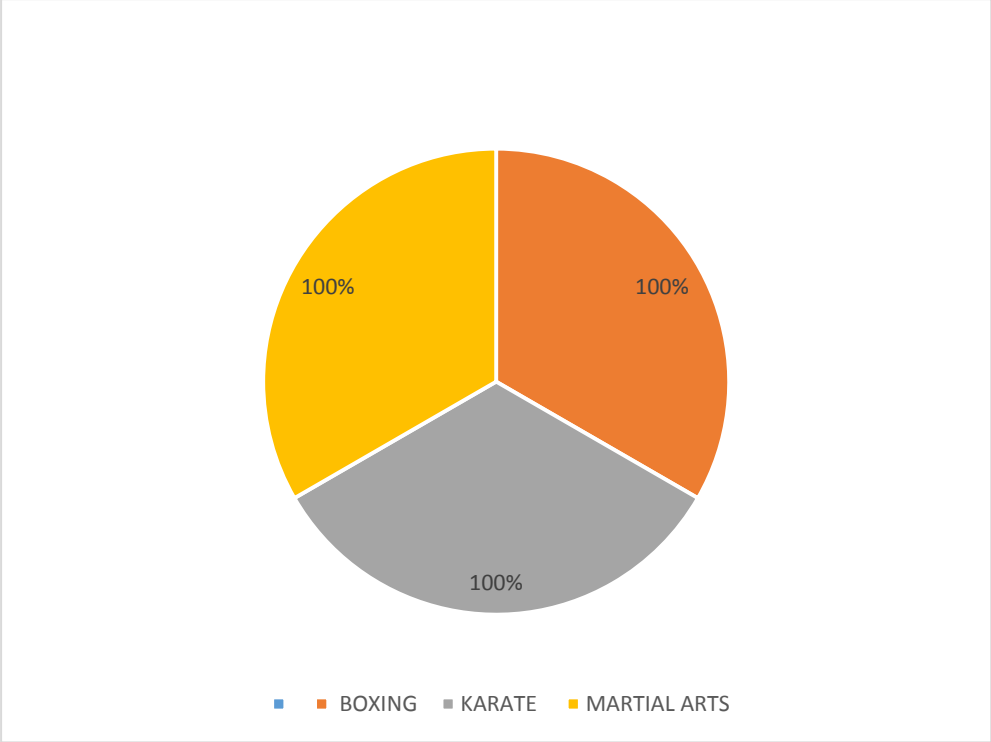
Type of sport		YEARS OF PRACTICE			Total
		1	2	ABOVE 3	
BOXING	n	32	6	2	40
	%	80.00%	15.00%	5.00%	100.00%
FOOTBALL	n	20	0	0	20
	%	100.00%	0.00%	0.00%	100.00%
MARTIAL ARTS	n	52	23	25	100
	%	52.00%	23.00%	25.00%	100.00%
Total	n	104	29	27	160
	%	65.00%	18.10%	16.90%	100.00%

Majority of the children 104(65%) played for a period of one year, 29(18%) of the children played for a period of 2 years and 27(16.9%) of the children played for a period of more than 3 years.

GRAPH 1: DURATION OF SPORTS PARTICIPATION IN YEARS



PIE CHART 2: SUPERVISED BY COACH



All the sports were played under the supervision of the coaches (100%).

TABLE 3: KNOWLEDGE REGARDING RISK ASSOCIATED IN THE SPORTS PLAYED

Type of sport		RISK IN GAME		Total
		YES	NO	
BOXING	n	22	18	40
	%	55.00%	45.00%	100.00%
FOOTBALL	n	12	8	20
	%	60.00%	40.00%	100.00%
MARTIAL ARTS	n	61	39	100
	%	61.00%	39.00%	100.00%
Total	n	95	65	160
	%	59.40%	40.60%	100.00%

95(59.4%) felt that there was a risk of injury in the sports they played. 22(55%) of children practicing the sport boxing, 12(60%) of children practicing football and 61(61%) practicing martial arts have revealed their fear for risk of injury during their sports participation.

GRAPH 2: KNOWLEDGE REGARDING RISK ASSOCIATED IN THE SPORTS PLAYED

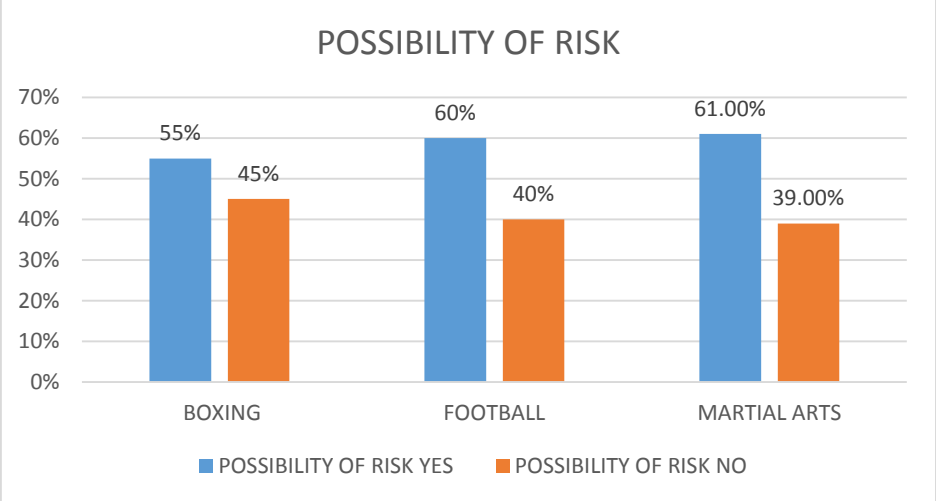


TABLE 4: KNOWLEDGE REGARDING THE COMMON INJURIES

Type of sport		INJURY POSSIBLE				Total
		FACE	HAND	LEG	OTHERS	
BOXING	n	24	1	10	5	40
	%	60.00%	2.50%	25.00%	12.50%	100.00%
FOOTBALL	n	7	0	13	0	20
	%	35.00%	0.00%	65.00%	0.00%	100.00%
MARTIAL ARTS	n	41	23	29	7	100
	%	41.00%	23.00%	29.00%	7%	100.00%
Total	n	72	24	52	12	160
	%	45.00%	15.00%	32.50%	7.50%	100.00%

72 children (45%) felt that face is the common site of injury followed by which 52 children (32.5%) felt leg injury is common,24(15%) felt hand injury and 12 (7.5%) felt other sites.

GRAPH 3: KNOWLEDGE REGARDING THE COMMON INJURIES

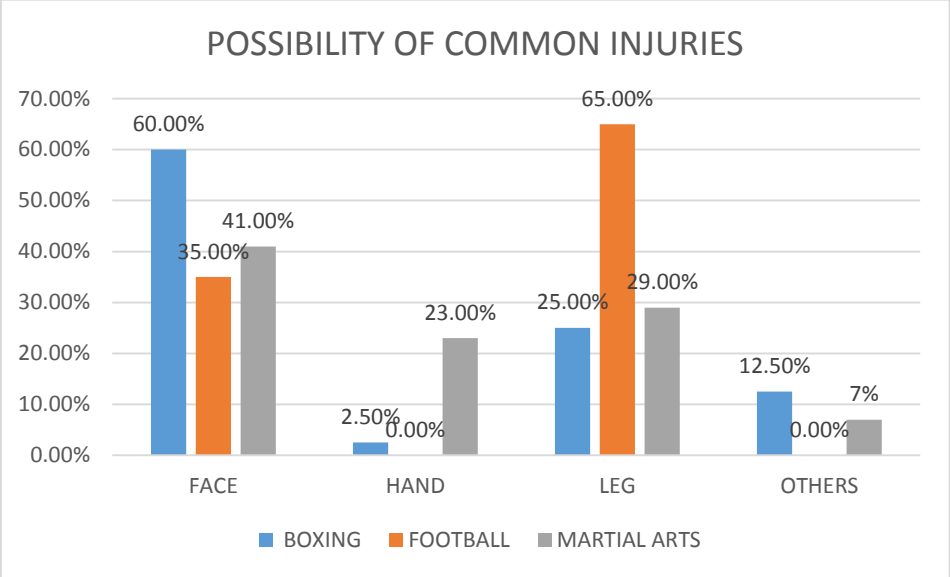


TABLE 5: KNOWLEDGE REGARDING FIRST AID MEASURES AND EMERGENCY CARE

Type of sport		RESPONSE TO EMERGENCY			Total
		EMERGENCY KIT	VISIT DENTIST	VISIT DOCTOR	
BOXING	n	0	40	0	40
	%	0.00%	100.00%	0.00%	100.00%
FOOTBALL	n	4	11	5	20
	%	20.00%	55.00%	25.00%	100.00%
MARTIAL ARTS	n	11	64	25	100
	%	11.00%	64.00%	25.00%	100.00%
Total	n	15	115	30	160
	%	9.40%	71.90%	18.80%	100.00%

115(71.9%) of children would visit a dentist in case of tooth related emergencies compared to 30(18.8%) who replied that they would visit a general physician and 15(9.4%) replied that they would use an emergency kit.

GRAPH 4: KNOWLEDGE REGARDING FIRST AID MEASURES AND EMERGENCY CARE

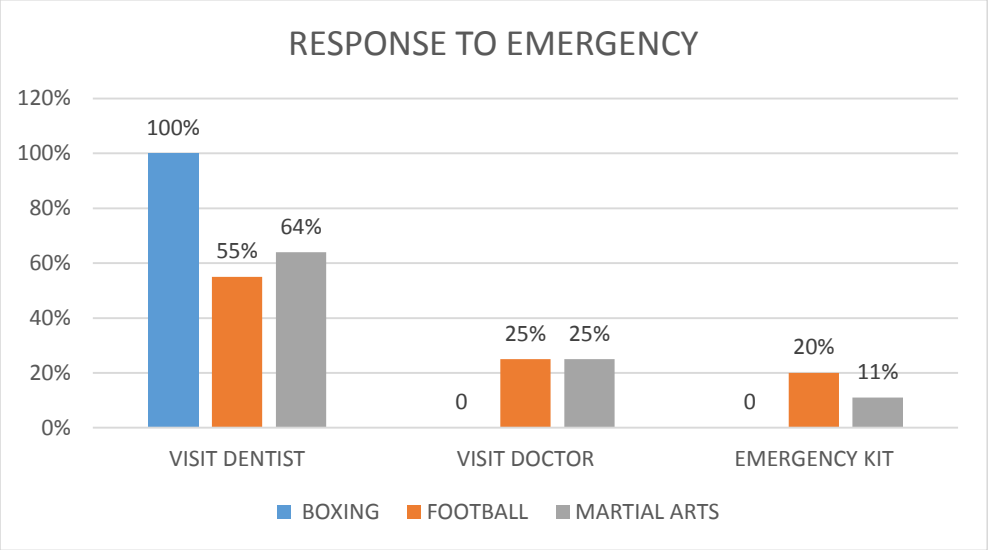


TABLE 6. AWARENESS OF MOUTHGUARDS

Type of sport		AWARENESS OF MOUTHGUARD		Total
		NO	YES	
BOXING	n	0	40	40
	%	00.00	100.0%	100.00%
FOOTBALL	n	19	1	20
	%	95.00%	5.00%	100.00%
MARTIAL ARTS	n	27	73	100
	%	27.00%	73.00%	100.00%
Total	n	46	114	160
	%	28.75%	71.25%	100.00%

114(71.25%) children were aware about the use of mouthguards compared to the 46(28.75%) of the children were unaware about it.

GRAPH 5: AWARENESS OF MOUTHGUARDS

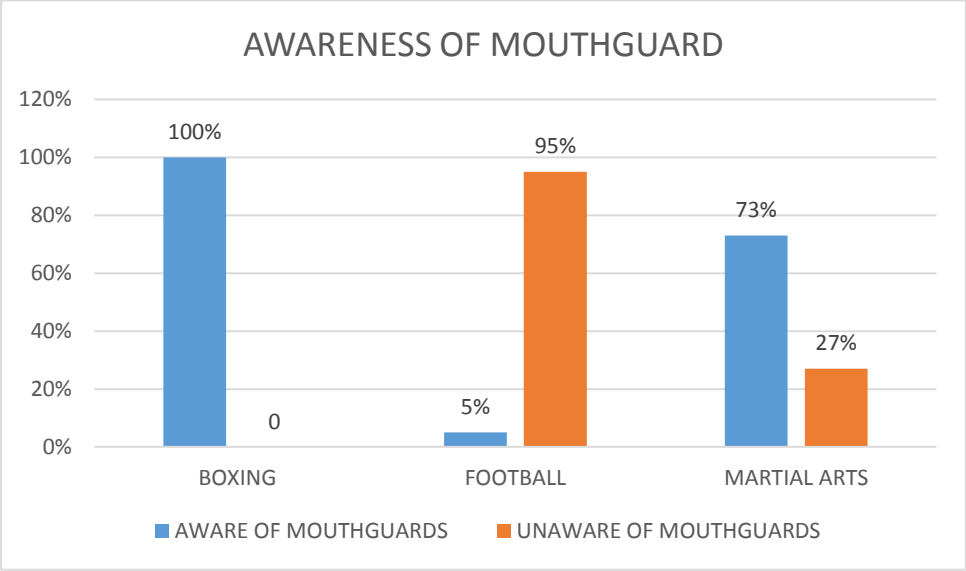
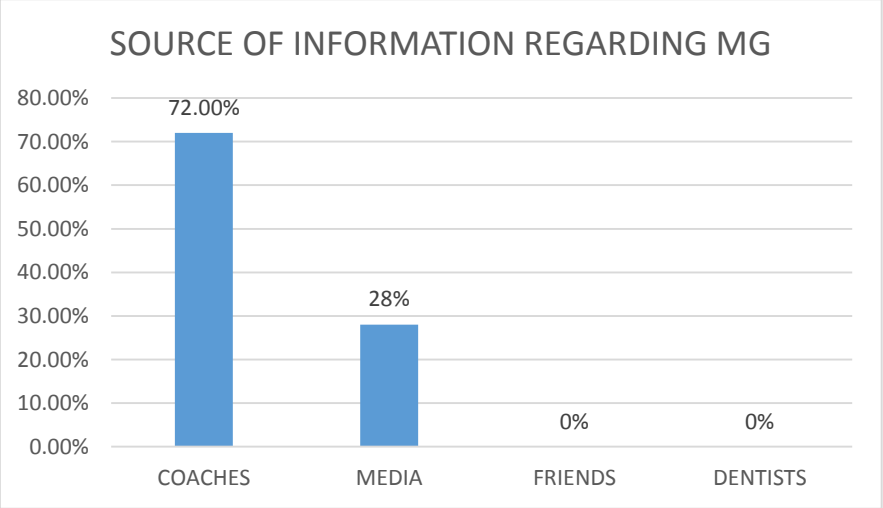


TABLE 7: SOURCE OF INFORMATION REGARDING MOUTHGUARDS

Type of sport		SOURCE OF INFORMATION				Total
		COACHES	MEDIA	FRIENDS	DENTIST	
BOXING	n	34	6	0	0	40
	%	85%	15%	0	0	100.00%
FOOTBALL	n	0	1	0	0	1
	%	0	5%	0	0	5.00%
MARTIAL ARTS	n	48	25	0	0	73
	%	48%	25%	0	0	73.00%
Total	n	82	32	0	0	114
	%	72%	28%	0	0	100.00%

GRAPH 6: SOURCE OF INFORMATION REGARDING MOUTHGUARDS



Among the 114 children who were aware of mouthguards, 82 (72%) of the children got the source of information regarding the role of mouthguards in prevention of the orofacial injuries from the coaches and the remaining 32(28%) children obtained the information from the mass media.

TABLE 8: PARTCIPANTS USING MOUTHGUARDS

Type of sport		USED MOUTHGUARD?		Total
		NO	YES	
BOXING	n	0	40	40
	%	0	100%	100.00%
FOOTBALL	n	20	0	20
	%	100.00%	0.00%	100.00%
MARTIAL ARTS	n	91	9	100
	%	91.00%	9.00%	100.00%
Total	n	111	49	160
	%	69.38%	30.62%	100.00%

At the start of the study among the total population 49(30.62%) were already using mouthguards and 11 (69.38%) were not using mouthguards.

GRAPH 7: PARTCIPANTS USING MOUTHGUARDS

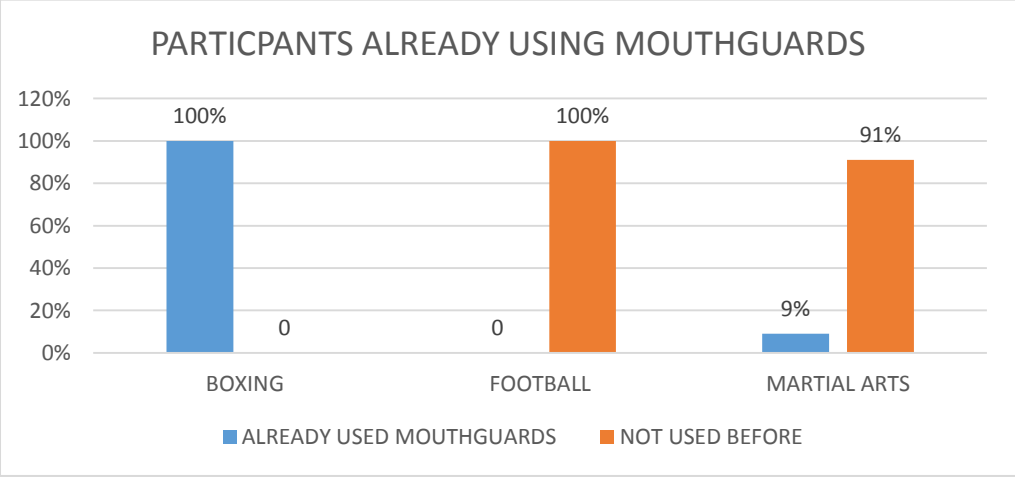


TABLE 9: WILLINGNESS TO USE MOUTHGUARDS

Type of sport		WILLINGNESS TO USE MOUTHGUARD		Total
		NO	YES	
BOXING	n	0	40	40
	%	0.00%	100.00%	100.00%
FOOTBALL	n	0	20	20
	%	0.00%	100.00%	100.00%
MARTIAL ARTS	n	0	100	100
	%	0%	100%	100.00%
Total	n	0	160	160
	%	0	100.00%	100.00%

All the 160 children (100%) showed willingness to use mouthguards.

GRAPH 8: WILLINGNESS TO USE MOUTHGUARDS

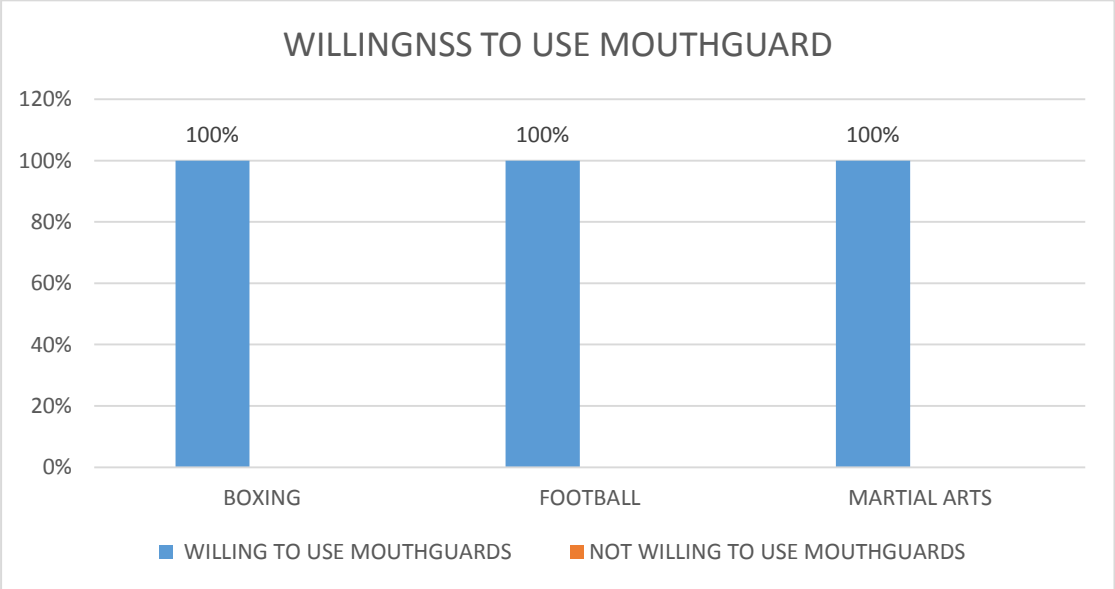


TABLE 10: REGULARITY IN WEARING MOUTHGUARD

Type of sport		REGULARITY IN WEARING MOUTHGUARD		Total
		0ccassionally	Regular	
BOXING	n	0	40	40
	%	0.00%	100.00%	100.00%
FOOTBALL	n	12	8	20
	%	60.00%	40.00%	100.00%
MARTIAL ARTS	n	6	94	100
	%	6.00%	94.00%	100.00%
Total	n	18	142	160
	%	11.25%	88.75%	100.00%

142 children (88.75%) regularly used the mouthguards in comparison to the 18 children (11.25%) who occasionally used them.

GRAPH 9: REGULARITY IN WEARING MOUTHGUARD

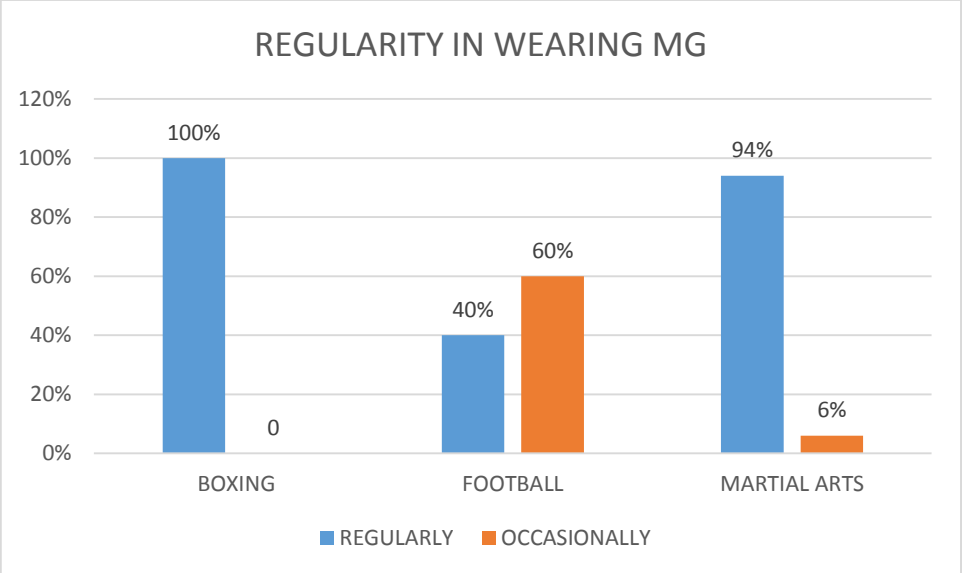


TABLE 11: EFFECTIVENESS OF MOUTHGUARD IN PREVENTION OF ORO-FACIAL INJURIES

Type of sport		EFFECTIVENESS OF MOUTHGUARD		Total
		NO EFFECT	GOOD	
BOXING	n	0	40	40
	%	0.00%	100.00%	100.00%
FOOTBALL	n	12	8	20
	%	60.00%	40.00%	100.00%
MARTIAL ARTS	n	6	94	100
	%	6.00%	94.00%	100.00%
Total	n	18	142	160
	%	11.25%	88.75%	100.00%

142(88.75%) of the population believed that use of mouthguards prevented oro-facial injuries as they were regularly using them during their sports activity.

GRAPH 10: EFFECTIVENESS OF MOUTHGUARD IN PREVENTION OF ORO-FACIAL INJURIES

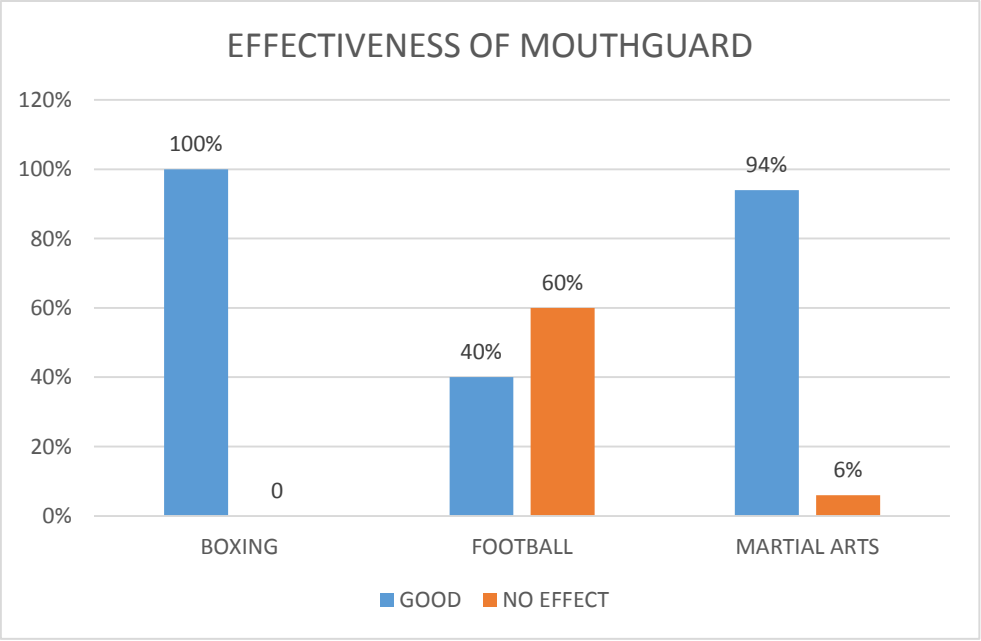


TABLE 12: INCIDENCE OF ORO-FACIAL INJURY DURING SPORTS ACTIVITY WITH AND WITHOUT USING MOUTHGUARDS

Type of sport		SUSTAINED OROFACIAL INJURY		Total
		WITHOUT MG	WITH MG	
BOXING	n	0	0	40
	%	0	0	100.00%
FOOTBALL	n	3	0	20
	%	15%	0	100.00%
MARTIAL ARTS	n	2	0	100
	%	2%	0	100.00%
Total	n	5	0	160
	%	3.12%	0	100.00%

Only 5 (3.12%) among the 160 children sustained an orofacial injury without a mouthgaurd in comparison to 155 (96.8%) children who were free of trauma.

GRAPH 11: INCIDENCE OF ORO-FACIAL INJURY DURING SPORTS ACTIVITY WITH AND WITHOUT USING MOUTHGUARDS

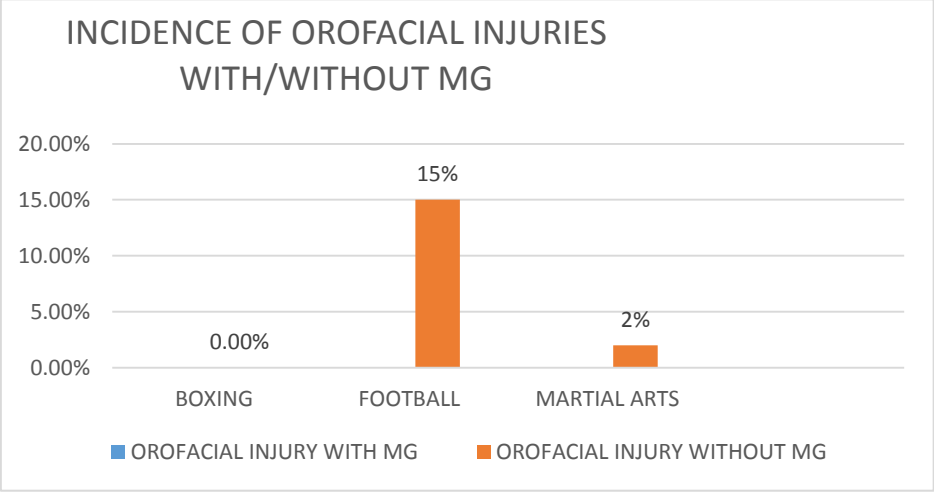


TABLE 13: COMFORT OF USING MOUTHGUARD

Type of sport		COMFORT OF USING MOUHGUARD		Total
		NO	YES	
BOXING	n	0	40	40
	%	0.00%	100.00%	100.00%
FOOTBALL	n	12	8	20
	%	60.00%	40.00%	100.00%
MARTIAL ARTS	n	6	94	100
	%	6.00%	94.00%	100.00%
Total	n	18	142	160
	%	11.25%	88.75%	100.00%

142(88.75%) of the children felt comfortable using mouthguards compared to 18(11.25%) who were not comfortable with its use.

GRAPH 12: COMFORT OF USING MOUTHGUARD

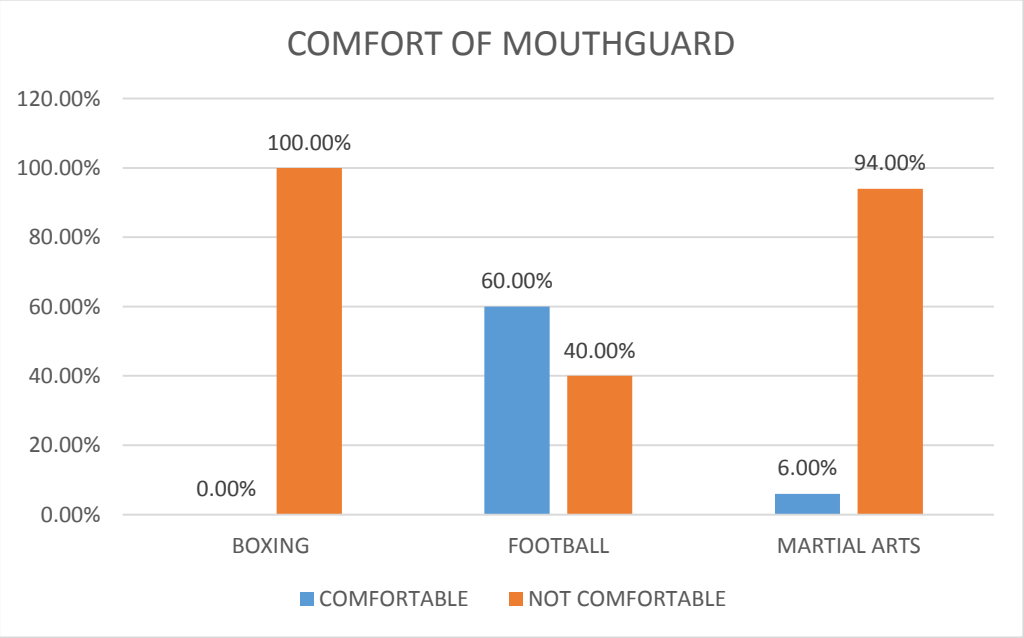


TABLE 14: WILLINGNESS TO CONTINUE USING MOUTHGUARD

Type of sport		WILLINGNESS TO CONTINUE USING MOUTHGUARD		Total
		NO	YES	
BOXING	n	0	40	40
	%	0.00%	100.00%	100.00%
FOOTBALL	n	12	8	20
	%	60.00%	40.00%	100.00%
MARTIAL ARTS	n	6	94	100
	%	6.00%	94.00%	100.00%
Total	n	18	142	160
	%	11.25%	88.75%	100.00%

142 children **(**88.75%) of the respondents stated that they would continue to use the mouth guard compared to the 18 children (11.25%) who were not willing to continue its use.

GRAPH 13: WILLINGNESS TO CONTINUE USING MOUTHGUARD

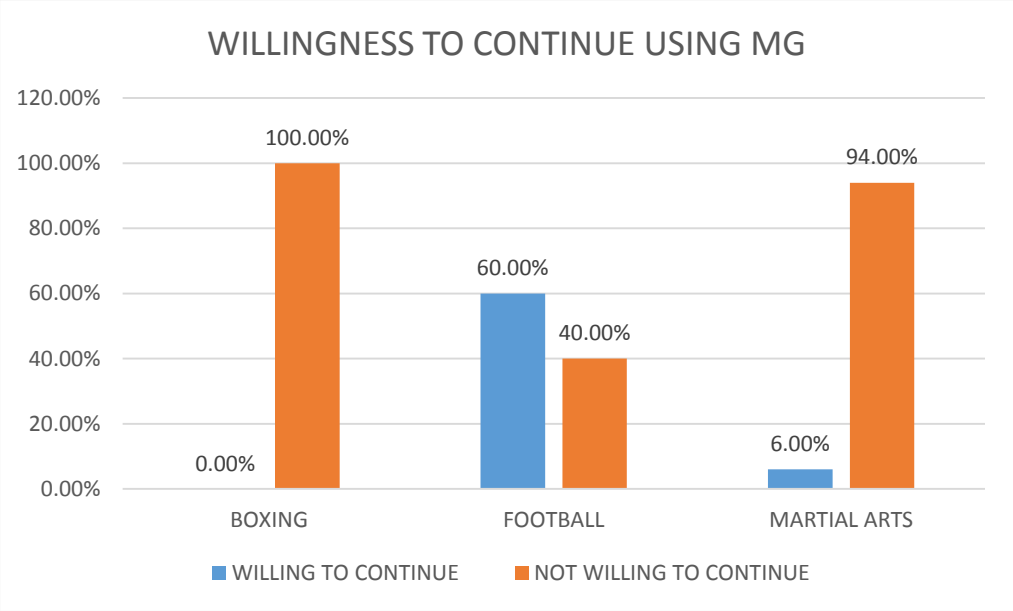
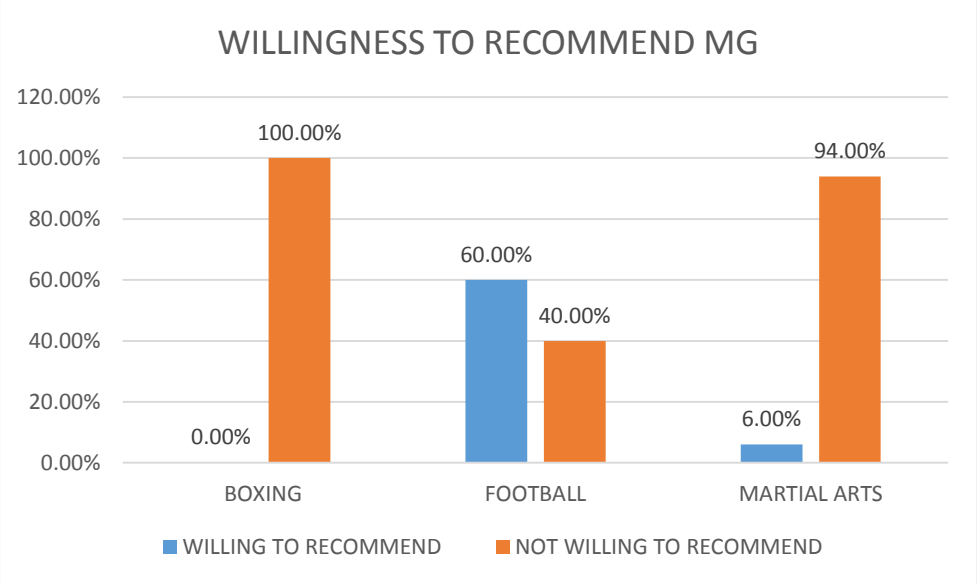


TABLE 15: WILLINGNESS TO RECOMMEND TO OTHERS

Type of sport		WILLINGNESS TO RECOMMEND TO OTHERS		Total
		NO	YES	
BOXING	n	0	40	40
	%	0.00%	100.00%	100.00%
FOOTBALL	n	12	8	20
	%	60.00%	40.00%	100.00%
MARTIAL ARTS	n	6	94	100
	%	6.00%	94.00%	100.00%
Total	n	18	142	160
	%	11.25%	88.75%	100.00%

The 142 children (88.75%) of the respondents who were willing to continue using mouth guard as a protective device were also willing to recommend them to others.

GRAPH 14: WILLINGNESS TO RECOMMEND TO OTHERS



Discussion

DISCUSSION

The dentists can play a major role to educate, motivate, prevent and treat sports related injuries that provide the athlete optimal oral health. Sports Dentistry (SD) involves the prevention, maintenance and treatment of oral and facial injuries, as well as the collection and dissemination of information on dental trauma, in addition to stimulating research. It directs a duty of the dentist to detect problems of the athlete, such as mouth breathing, poor positioning of the arches, and properly administer medications free of substances, that may provide the positive doping present in many painkillers.[44]

In some team sports and contact sports such as boxing, judo, karate, jiu-jitsu, wrestling, sumo, soccer, basketball, volleyball, handball, mountain biking, motocross, hockey and skating the risk of injury due to the contact or impact can be considered high.[44] Contact sport athletes have up to 10% more probability of suffering orofacial injury when compared to non-practitioners and 33-56% risk of suffering a facial injury during his career[35]. In the 2007 Pan American Games, the uncomplicated crown fractures are the most common (44 to 62.5%), 39.8% of the injuries were fractures of enamel, and 21.9% of these were in daily practice or competition in their respective sports[34]. When considering each sport separately, 41.2% of the athletes in jiu-jitsu suffered dental trauma, 37.1% in team handball, 36.4% in basketball, football 23.2%, 22.3% in judo and 11.5% in hockey[5].

The dental trauma is the most common in sports activities and it is often associated with serious consequences such as aesthetic, functional, economic and psychological problems. It will depend on severity, and it can even exclude the athlete from an important competition.

Many of dento alveolar trauma resulting from sports activity could be minimized by the use of appropriate mouthguards, recommended by the American Dental Association (ADA) in sports since 1950. The mouthguard does not affect systemic functions of the athlete, and acts better dissipating the stresses transmitted in the area of impact and reducing the incidence of: lacerations of soft tissue, trauma to the anterior teeth after a frontal blow, damage to the posterior teeth in both arches and mandibular fractures. Despite benefits, there is a lack of awareness among athletes to use the protectors during training and competitions. This fact is justified due to discomfort, breathing and pronunciation difficulties, besides the possible drop in athletic performance.[32] Hence this study was undertaken to assess the attitude and awareness of athletically active children regarding sports related traumatic injuries, protective devices and preventive measures and to assess the effectiveness and acceptability of mouthguards in prevention of sports related dental injuries.

In the present study children who were already using mouthguards used semi-individual 'boil and bite' mouthguards. These are the most commonly used mouthguards, and are good for growing children as they can be

re-moulded over time. Although literature has shown custom-made mouthguards to be more effective they are generally more expensive than stock and 'boil and bite' mouthguards[27]. A number of parents stated that the cost of mouthguards was a barrier to their use. In addition, as children's dentition changes rapidly, a customised mouthguard may not always be practical. In such circumstances, a 'boil and bite' mouthguard may be more appropriate. Here, dental practitioners could have a role in helping to ensure that 'boil and bite' mouthguards are fitted properly and are not loose.

In the present study a definite gender predilection for sports was recorded among the age group of 6-12 years. Males (80.6%) were found to be more actively involved in competitive sport activities than female (19.3%). These findings were in accordance with the findings of Margaret o'malley.[37] It has been suggested that a higher injury incidence for men and boys may be due to differences in aggression between sexes when competing. These findings can be considered as the one of the reasons why the majority of the studies show high incidence of dental trauma among boys than girls.[6,36]

In the present study the various competitive sport activities participated by the children were boxing, martial arts like karate, taekwondo, judo and football suggesting that boys were involved in more aggressive games. All the children in the study played the respective games under the supervision of the coach. More than 59% felt the game they were playing was risky owing to the fact that most of these games were contact sports which require physical

contact between the players. These children's perception about the risk of oro-facial injuries in contact sports like martial arts and boxing was found to be relatively similar to the study done by Cohensa et al.[30]

In the present study, the knowledge regarding the risk of injury to the various body parts that came into contact at the time of play is related to the game they played and the part that is in contact during the play. In boxing and martial arts group majority felt oro-facial region was the higher site of risk (60%) whereas football group felt legs were a common site of risk of injury (65%).

With an increase in incidence of oro-facial injuries, knowledge regarding emergency care is imperative. 71.9% of the children in this study were aware that they should visit a dentist in times of dental trauma.

The awareness regarding the beneficial effects of mouthguards was 71.25% (114) children among the study population and the major source of the information was through coaches(72%) and media (28%). Kinoshita-Kawano et al reported that 45% of the children got the information about mouthguards from and media and 10% from the dentist[33]. Ilia et al study shows that the major source of advice 62.7% from family, friends and parents, 50% from the coaches, 45.9% from dentists, 14.2% from media.[42] The present study implies that the pediatric dentists, orthodontists, general practitioners should be the main information bureau centre for oro-facial injuries and preventive guards.

At the beginning of the study 49 children (30.60%) were already using mouthguards. Majority of them using mouthguard belonged to the boxing group and 9(9%) of them belonged to the martial arts group. In the study 100% of the children were willing to use the mouthguards and after intervention 142(88.75%) of them were using mouthguards regularly during their sports activity, while 18(11.2%) were using them occasionally and cited reasons such as discomfort and difficulty in communication with usage of mouthguards at the time of play. Similar findings were observed in the study done by Berg R Berky et al.[6]

On evaluation of the effectiveness of mouthguards in prevention of orofacial injuries, 142(88.75%) of the children regularly used the mouthguards and reported that its usage helped in prevention of orofacial injuries.similar findings were reported in studies done by Ilia et al.[42]

During the study period 5(3.12%) children who were not regularly using mouthguards sustained oro-facial injuries. Among them, 3 children belonged to the football group and 2 belonged to the martial arts group. Some sports such as mixed martial arts are scored in impacting an opponent, while others including football and rugby require tackling of players. These sports are often known as Full- contact as the sport cannot be undertaken without contact and hence all the sports warrant the usage of mouthguards to decrease the risk of any sports related traumatic injuries.

142 children (88.75%) were comfortable wearing the mouthguards and do not sustain any oro-facial injury compared to the 18 children (11.25%) who were not comfortable with using mouthguards, among which 5 of them sustained oro-facial injuries who wear occasional wearers of mouthguards. These children did not sustain any injuries after wearing mouthguards. A study done by Onyeaso CO reported that wearing mouthguard reduced the prevalence and severity of orofacial injuries during sports in secondary school athletes from Nigeria.[25] All the 142(88.75%) of the children who were regularly using the mouthguards were willing to continue using mouthguards as they did not have any discomfort with communication. This suggested that when there was choice between protection and discomfort, protection from injuries was a priority. These children (88.75% of the total sample) were also ready to recommend the use of mouthguards to others.

The present study findings shows a predominant male participation in sports activities, with all sports being monitored by the coach and majority of them having a knowledge regarding the risk associated with the sport they are playing and the common sites of injury as well as emergency care following trauma. The main source of information obtained regarding prevention care and minimizing orofacial trauma was from the coaches and media. Although at the beginning of the study only 49 children (30.62%) were using mouthguards, following counseling and intervention 142 children (88.75%) were using mouthguards regularly and felt it helped in minimizing the risk of

sustaining oro-facial trauma and were willing to use it continuously and recommended it to others as well in contrast to 18 children (11.25%) who used them occasionally. 5 children among the 18 who were occasional users sustained oro-facial injury, highlighting the importance of role of mouthguards in prevention of oro-facial trauma.

The present study is a preliminary survey on the most popular competitive sports practiced by children to collect the information on some basic parameters like possibility of risks in their sport, knowledge of oro-facial injuries, emergency care and awareness of protective devices, effectiveness of using mouthguards and attitude of children towards the use of mouthguards as protective devices to help them understand the role of protection and safety measures in the sport they played. There is growing opinion that while much progress has been made in the use of mouthguards, the dental professional could do much more to promote their use by educating and training to develop skills in emergency care, fabrication of mouthguards and its modification. This can be at an individual level within the dental practice setting or more widely by targeting governing bodies, parents, coaches and schools and also by finding ways to make mouthguards more affordable to the public.

Conclusion

CONCLUSION

The following conclusions can be drawn from the current study:

- The present study shows a predominant male participation in sports activities.
- Majority of the children 104(65%) were playing their sport for a period of one year.
- All the sports were played under the supervision of the coaches.
- Majority of the children 95(59%) had adequate knowledge regarding the risk associated with the sport they played and the common sites of injury as well as emergency care following trauma.
- 72 children (45%) felt that facial injuries were a common occurrence followed by leg injury 52 (32.5%), hand injury 24(15%) and other site 12(7.5%).
- According to the sport played by the children, boxing 24(60%) and martial arts 41(41%) groups felt that facial injuries will be predominant, whereas the football group 13(65%) felt that leg injuries were more common.

- Majority of the children 115 (71.9%) replied they would visit a dentist in case of tooth related emergencies whereas 30(18.8%) replied that they would visit a general physician and 15 (9.4%) replied that they would use an emergency kit.

- Majority of the children 114 (71.25%) were aware about the use of mouthguards compared to the 46 (28.75%) of the children who were unaware about it.

- The main source of information obtained regarding prevention care and minimizing oro-facial trauma was from the coaches and media.

- In spite of greater sports participation at the beginning of the study, the usage of preventive measures was minimal 49 (30.62%) which increased to 142 (88.75%) after intervention and counseling.

- Majority of the children 142 (88.75%) were using the mouthguards regularly and felt it helped in minimizing the risk of sustaining oro-facial trauma and were willing to use it continuously.

- Majority of the children 142 (88.75%) who were willing to continue using mouth guard as a protective device were also willing to recommend the use of mouthguards to others.

- Minimal percentage of children 5 (3.12%) who were occasional users sustained oro-facial injury, highlighting the importance of role of mouthguards in prevention of oro-facial trauma.

Summary

SUMMARY

Epidemiological studies have reported sports activities particularly contact sports as one of the etiological factor for dental trauma. These accidents have been reported both during training as well as competitive sessions and they can be prevented by following preventive protocols particularly by using mouthguards. Despite benefits, there is a lack of awareness among the athletes to use the mouth protectors during training and competition.

Hence, the present study was carried out to assess the attitude and knowledge of athletically active children regarding sports related oro-facial injuries, their emergency care, and the effectiveness of mouthguards in prevention of sports related oro-facial injuries.

The present study was carried out among 160 athletically active children aged 6-12 years of both the genders practicing Boxing, Football and Martial arts (Karate, taekwondo, judo) from various sports academies in and around Chennai.

The results showed among the total sample, 129 (80.6%) were boys and 31(19.4%) were girls.104(65%) of the children played for a period of one year, 29(18%) of the children played for a period of 2 years and 27(16.9%) of the children played for a period of more than 3 years and all the sports were played under the supervision of the coaches (100%). 59% of the children had

adequate knowledge regarding the risk associated with the sport they played. 45% felt that facial injuries were a common occurrence followed by leg injury (32.5%), hand injury(15%) and other site(7.5%).

The knowledge regarding oro-facial injuries and their emergency care was found to be adequate. Majority of the children (71.9%) told they would visit a dentist in case of tooth related emergencies whereas 18.8%replied that they would visit a general physician and 9.4%replied that they would use an emergency kit.

On evaluation of the total sample majority of the children 114(71.25%) were aware about the use of mouthguards, the coaches (72%) and media (28%) was the main source of information. At the start of the study 30.62% were already using the mouthguards and 69.38% were not using mouthguards. All the 160 children (100%) of the children showed willingness to use mouthguards. After intervention and counseling 142 children (88.75%) were using the mouthguards regularly and felt it helped in minimizing the risk of sustaining oro-facial trauma and were willing to use it continuously. 5 children (3.12%) who were occasional users sustained oro-facial injury. 142 children (88.75%) who used the mouthguards regularly were comfortable wearing the mouthguards. 18 children (11.25%) were not comfortable with its use as they had a communication problem. However, majority of the children 142 (88.75%) stated that they would continue the use of a mouthguard during their

sport activity were also willing to recommend the use of mouthguards to others.

The present study findings showed the importance of mouthguards in prevention of sports related oro-facial injuries and the role of the dentist to educate players regarding sports related injuries and preventive measures that can be practiced by conducting regular preseason oral health screenings to check for caries, missing, loose teeth, bite discrepancies, at- risk dentition, fabricating custom-made mouthguards when necessary and being available for emergency care.

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Annexures

ANNEXURE-I

RAGAS DENTAL COLLEGE & HOSPITAL
(Unit of Ragas Educational Society)
Recognized by the Dental Council of India, New Delhi
Affiliated to The Tamilnadu Dr. M.G.R. Medical University, Chennai
2/102, East Coast Road, Uthandi, Chennai - 600 119. INDIA
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TO WHOM SO EVER IT MAY CONCERN

Date: 12.12.17
Place: Chennai

From
The institutional review board,
Ragas dental college,
Uthandi,
Chennai - 600119.

The dissertation topic titled **"ASSESSMENT OF KNOWLEDGE AND ATTITUDE OF CHILDREN REGARDING THE SPORTS RELATED TRAUMATIC INJURIES AND ITS PREVENTION USING MOUTHGUARDS "** submitted by **Dr.DEVI CHANDRIKA K** has been Approved By Institutional Ethics Board of Ragas Dental College and Hospital.

Dr.N.S.AZHAGARASAN, MDS.,
Member secretary,
Institutional ethics board,
Ragas dental college & hospital,
Uthandi, chennai- 600119.

ANNEXURE-II

QUESTIONNAIRE TO EVALUATE THE AWARENESS AND KOWLEDGE OF ATHLETES REGARDING SPORTS RELATED INJURIES

NAME : AGE : SEX: SL NO:

ADDRESS : DATE:

SCHOOL NAME:

PARENT OCCUPATION:

1. Which active sports you participate in?

A) Boxing B) Foot ball

C) Martial arts D) any other

2 .Since how many years you have been participating in this sports/games?

A) One year B) two years

C) Above three years

3. Is your game supervised by coach?

A) Yes B) No

4. Have you ever felt sports/games in which you indulge in are risky?

A) Yes B) No

5. According to you which is the common injury you might encounter with ?

A) Face injury B) hand injury

C) Leg injury D) Any other

6. What do you at the time of injury?

A) Use an emergency kit B) visit a doctor

C) Visit a dentist for treatment

7. Have you ever heard of any device to prevent sports related injuries like mouthguard ?

A) Yes B) no

8. Through whom you first heard of a mouth guards?

A) Coaches B) Friends

C) Dentists D) Media

9. Have you ever used a mouthguard during the sports activity?

A) Yes B) No

10. Are you willing to use a mouthguard in your games /sports?

A) Yes B) No

ANNEXURE-III

QUESTIONNAIRE FOR ASSESSMENT OF EFFICIENCY AND ACCEPTABILITY OF MOUTHGUARDS

NAME : AGE : SEX: SL NO:

ADDRESS: DATE:

SCHOOL NAME:

PARENT OCCUPATION:

1. Have you been wearing a mouthguard?

A) Occasionally B) Regularly

2. How effective was the mouth guard in prevention of trauma?

A) Good B) No Effect

3. Have you sustained any orofacial injuries during practice or any game situation ?

A) Yes with a mouthguard B) Yes without a mouthguard

C) No

4. Were you comfortable wearing mouthguard?

A) Yes B) No

5. Are you willing to continue wearing this mouthguard?

A) Yes B) No

6. Would you suggest other players to use mouthguard?

A) Yes B) No

ANNEXURE-IV

CONSENT FORM

I_____, the parent/guardian of_____, hereby give consent for the participation of my son/daughter in the study titled **"ASSESSMENT OF KNOWLEDGE AND ATTITUDE OF CHILDREN REGARDING THE SPORTS RELATED TRAUMATIC INJURIES AND ITS PREVENTION USING MOUTHGUARDS "** being conducted by **K.DEVI CHANDRIKA** , a postgraduate student of Ragas dental college and hospital, Chennai. Under the guidance of **Dr.M.JAYANTHI,** Professor and Head, department of paedodontics and preventive dentistry. I have been clearly informed about the procedure/techniques of the study and I voluntarily, unconditionally, freely give my consent for the active participation of my child without any form of pressure and in a mentally and conscious state.

Signature of the investigating doctor

Signature of the Patient's parent/ Guardian.

ANNEXURE-V

சிகிச்சை ஒப்புதல் படிவம்

_____ஆகிய நான் _____ என்கிற

(பெற்றோரின்பெயர்) *(குழந்தையின்பெயர், வயது)*

என்குழந்தையின் வாய் / பல் பகுதியை ஆராய்ந்து பார்க்க ஒப்புதல் அளிக்கிறேன். மேலும், இந்த ஆராய்ச்சியினை மேற்கொள்வதினால் விளையக்கூடிய நன்மைகளையும், அதனால் விளையக்கூடிய அசௌகரியங்களையும் அறியப் பெற்றப்பின், நான் எவ்வித அச்சமுமின்றி தன்னிச்சையாகவும், முழுமனதுடன் என்னுடைய சம்மதத்தினை அளிக்கிறேன்.

கையொப்பம்:

தேதி, இடம்:

சாட்சிகள்;

ANNEXURE-VI

URKUND

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